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DEPARTMENT OF TROPICAL RESEARCH
WILLIAMS GALAPAGOS EXPEDITION

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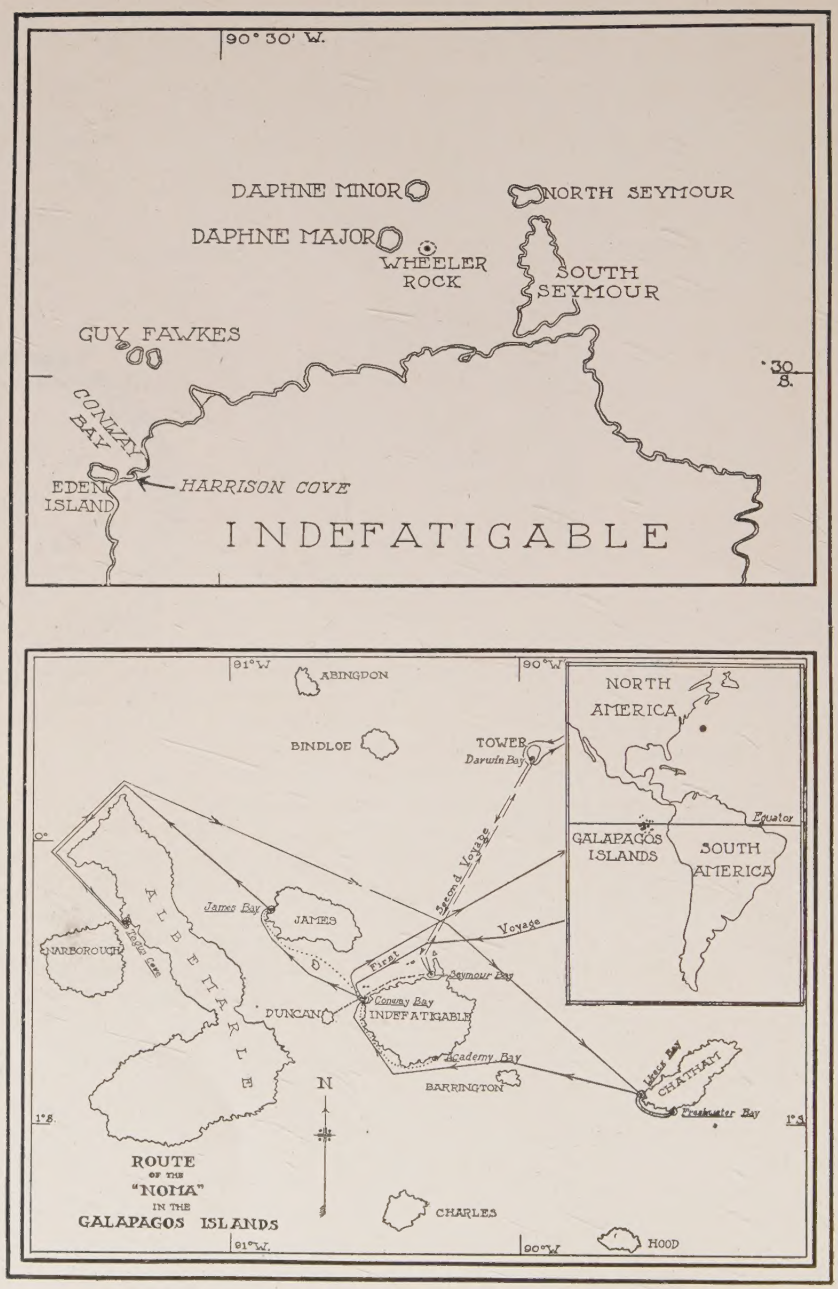

Plate A. SKETCH MAP OF GALAPAGOS ISLANDS

Route of the *Noma*, and details and location of the Archipelago.

First form on press February 27, 1924

Zoologica, Vol. V, No. 4.

A CONTRIBUTION TO THE ICHTHYOLOGY OF THE GALAPAGOS.

By J. T. Nichols.

(Figure 11).

The American Museum of Natural History has recently received, through Mr. William Beebe, Director of the Harrison Williams Galapagos Expedition of the Department of Tropical Research, New York Zoological Society, an interesting collection of marine fishes from the Galapagos Islands, made in 1923.

Various fish collections have been made in these islands in past years, but these have been of a fragmentary nature, and the fishes of the islands are still imperfectly known. Two undescribed forms have been found in the present material, and two or three others, known from neighboring seas, deserve special mention, as follows:

Cypselurus nigricans (Bennett). Bennett, 1840, described this flying fish from "both the Atlantic and Pacific Oceans, in lat. 5° N." It is close to *Cypselurus furcatus* (Mitchill) 1815, New York. Recent authors have recognized *furcatus* and *nigricans* as distinct species both occurring in the Atlantic, but it is probable that Atlantic material referred to each is identical; and as the fish to hand agrees with Bennett's description, and is almost certainly what he had from the Pacific, his name is available for it.

It is 215 mm. in length to base of caudal, longest dorsal ray ½ head. Dorsal, 14; anal, 11. Pectorals blackish with a diagonal white stripe and white edging; dorsal pale with a black blotch between the 5th and 11th rays; ventrals pale with slight indication of dusky shading; anal pale; caudal dusky with a pale margin.

Haemulon scudderi (Gill). A specimen about 13 cm. long, from South Seymour I., of this common grunt of the west coast from Mexico to Panama, seems to be the first definite Galapagos record. On *a priori* grounds it was to have been expected there, but not necessarily so, as grunts are not very strong swimmers.

Eupomacentrus beebei[1] sp. nov.

The type, our only specimen, No. 8270, American Museum of Natural History, was collected in a rock pool at Eden, Indefatigable Island, April 1, by the Williams Galapagos Expedition, 1923. It is illustrated in a colored plate in the narrative volume of the Williams Expedition; "Galapagos; World's End," by William Beebe, published by Putnam.

[1] Named for William Beebe in view of his appreciation of the interest and beauty of a tropical reef and its brilliant fishes.

First form on press February 27, 1924.

It has a very striking color pattern as follows: in the alcoholic specimen dusky all round including pectoral and lower fins; center of top of head, top of back and spinous dorsal, orange (later fading to whitish); soft dorsal grey with a dusky base. A large black blotch surrounded by a blue ring on last two spines and anterior soft rays of dorsal, and extending onto the back below. Peduncle pale; caudal grey.

Length to base of caudal, 15 mm. Depth in this length, 1.8; head, 2.3. Eye in head, 2.4; interorbital, 3.0; maxillary, 4.5; depth of peduncle, 2.5; pectoral, 1.4; ventral, 1.3; longest dorsal spine, 2.7; longest dorsal ray, 2.1; longest anal ray, 2.2.

Upper and lower profiles of body about equally arched, forehead moderately steep and rounded. Tips of ventrals filamentous. Caudal with a shallow fork. Dorsal XII, 15, anal II, 14. Scales, 29.

There are light blue marks on the head, including a mark from snout to over front of eyes, thence, after a short break, continued back to nape. A spot in the mid-line between the eyes opposite the break in the above-mentioned mark. A blue spot on the base of the soft dorsal, and a blue spot bordered behind with dusky in its axil. Two blue spots followed by a blue stripe on the base of the anal. Some of the scales on sides faintly barred with blue. A color sketch from life has electric blue sides and a scarlet back.

There is nothing like this little fish described in the genus *Eupomacentrus*, where it seems to belong. Young Pomocentrids are at times very deceptive, and it should be noted that we have not seen so small a specimen of *Hypsypops rubicundus*.

Teuthis crestonis (Jordan and Starks).

A large surgeon fish from Indefatigable I. falls within probable individual variation for this species, found from Mexico to Panama. Its caudal is well forked, the upper lobe longest and narrow; color all round dusky, except a yellow margin to the pectoral fin.

Runula albolinea sp. nov.

Differs strikingly in color from *Runula azalea* with which it has been directly compared (specimens from Cape San Lucas). No alternate black and white cross marking on the fins as in that species. A narrow white line from over eye to upper caudal origin.

The type, No. 8271, American Museum of Natural History, was collected on Indefatigable Island by the Williams Galapagos Expedition, 1923. It is 43 mm. long to base of caudal. Depth contained 6.5 times in this length; head 4.5; snout and eye equal, 3.5 in length of head; width of mouth, 3.0; pectoral, 1.7; ventral, 2.6; caudal, 1.2; forked for about half its length. Dorsal beginning on the nape; its rays, 41; anal, 28.

Color in alcohol pale greyish to the level of the lower margin of the pupil, white below that line. A narrow white line passing over eye is continued back to the upper caudal origin, and there is another similar white line on the center of the head before dorsal. Dorsal, with a narrow pale edge subtended by a dusky stripe which broadens to tinge all but the base of the central half of the fin; other fins pale.

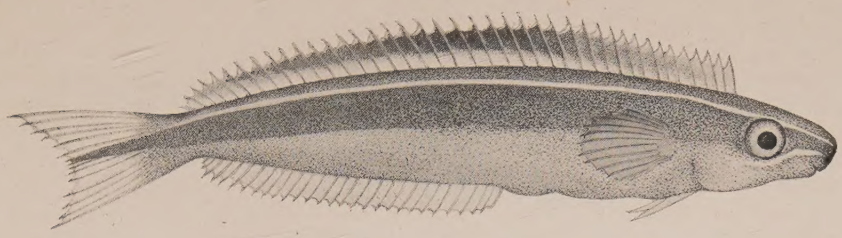

FIG. 11. *RUNULA ALBOLINEA* sp. nov.

A second example is of the same size and similar in every respect. Four other specimens measure from 35 to 46 mm. in standard length. The largest of these, which has been figured by Miss Isabel Cooper, is somewhat deeper. The color pattern of all is the same. All are from Conway Bay, on the northwest coast of Indefatigable Island, which island is also the type locality of *R. azalea*. It would seem more probable that the *Runula* from the coast would differ from that in the islands, than that a second species should occur in the islands where *R. azalea* was originally described. However, Cape San Lucas material examined agrees with the type description of *azalea*, and *albolinea* neither with that description nor with Cape San Lucas material.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

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APTERYGOTA OF THE WILLIAMS GALAPAGOS EXPEDITION

By J. W. Folsom.

(Plates III–V incl.).

The Apterygota collected by the Williams Galapagos Expedition sent out by the Department of Tropical Research, of the New York Zoological Society, and forming the subject of the present report, are as follows:

Heterolepisma intermedia sp. nov.
Acrotelsa galapagoensis Banks.
Lepidocyrtus intermixtus sp. nov.

The two species of Thysanura were collected by Professor W. M. Wheeler, and the single species of Collembola by Mr. William Beebe.

Types and other specimens are in the collections of the Department of Tropical Research of the New York Zoological Society.

Five species of Apterygota are now known from the Galapagos Islands, the Hopkins Stanford Expedition, 1898–1899, having taken three species, which were described by Mr. Nathan Banks. One of these three (*Acrotelsa galapagoensis* Banks) was present in the Williams collection, but the two others (*Lepisma insularis* Banks and *Machilis mutica* Banks) were not.

Heterolepisma intermedia sp. nov.

(Plate III, figs. 1–8; Plate IV, figs. 9–12).

Dorsally grayish or brownish with the scales; ventrally whitish; body color yellowish white. Legs whitish or spotted with brown or purplish, with yellow setae. Head short and broad. Thorax in width to height as 10:7; thoracic nota subequal; pronotum not strongly narrowing anteriorly, subquadrate with rounded angles. Body elongate, almost parallel-sided throughout, sub-cylindrical, dorsally strongly convex. Abdomen narrowing but slightly posteriorly, almost twice as long as the thorax (as 13:7). Tenth urotergite (figs. 1, 2) four times as long as the ninth, trapezoidal, with posterior angles rounded and posterior margin slightly concave. Antennae white, spotted with brown or purplish, the spots forming annulations in large specimens; length of antennae unknown.

First form on press February 27, 1924.

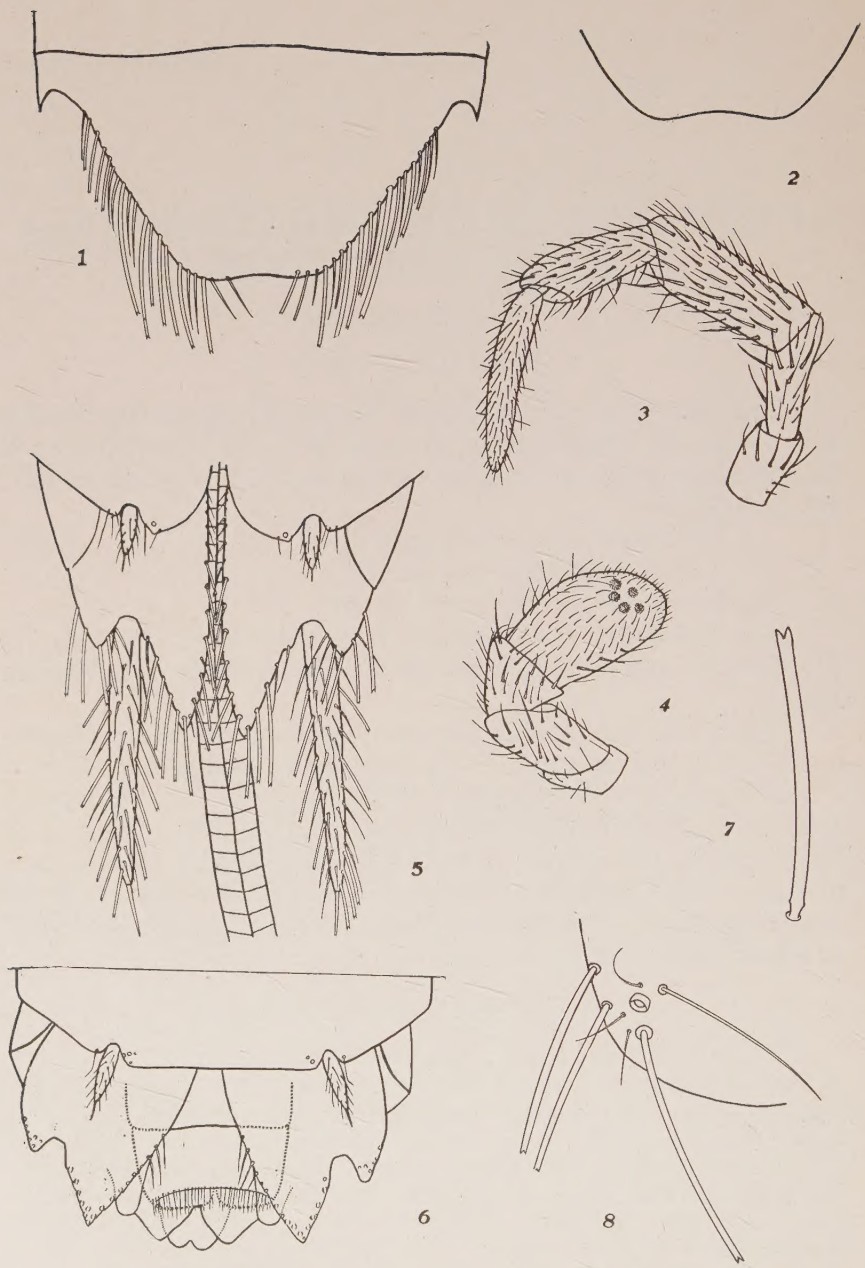

Plate III. 1, *Heterolepisma intermedia*, telson of female, × 80. 2, *Heterolepisma intermedia*, extremity of telson of male, × 80. 3, *Heterolepisma intermedia*, right maxillary palpus, × 100. 4, *Heterolepisma intermedia*, left labial palpus, × 100. 5, *Heterolepisma intermedia*, ventral aspect of extremity of abdomen of female, × 53. 6, *Heterolepisma intermedia*, ventral aspect of extremity of abdomen of male, × 53. 7, *Heterolepisma intermedia*, seta from front, × 370. 8, *Heterolepisma intermedia*, setal cluster of left postero-lateral angle of pronotum, × 175.

Palpi whitish, tinged with brown or purplish, with yellow setae. Maxillary palpi (fig. 3) with last four segments pigmented apically. Labial palpi (fig. 4) with last three segments pigmented faintly; last segment stout, subclavate, with five rounded papillate sense organs (fig. 4). Cerci of unknown length. Styli (fig. 5) two pairs, on eighth and ninth abdominal segments, respectively; white with yellow setae; styli of ninth segment long and large; those of the eighth small. Ovipositor (fig. 5) rod-like, tapering apically, extending beyond the paramedian processes a distance equal to four times the length of the latter; dorsal and ventral valves pseudosegmented. Paramedian processes (fig. 5) each extending not quite to the middle of the adjacent stylus; shorter and broader in the male (fig. 6) than in the female. Eighth urosternite undivided in the male (fig. 6).

All the setae are naked. Most of the setae of the head and body are bilobed apically (fig. 7), straight or slightly curving, and of different sizes. They are numerous on each side of the front, on the sides of the head, above the bases of the antennae, and on the posterior part of the abdomen. On the lateral margins of the thorax are sparse short setae, with occasional long setae. Each thoracic notum has 2 + 2 setal clusters or combs: at each postero-lateral angle a cluster (fig. 8), and on each side of the posterior margin a comb consisting of one macrochaeta between two small setae. Abdominal segments one to seven, inclusive, bear 3 + 3 setal combs: inner dorsal, outer dorsal and lateral (figs. 9–11); abd. 8, 2 + 2, dorsal and lateral; abd. 9 and 10, none. The macrochaetae of the combs are reduced in number as compared with those of most other species. Thus the inner dorsal comb has but one large seta between two small ones (fig. 9); the outer dorsal, two or three macrochaetae (fig. 10); and the lateral comb, two (fig. 11). Ventrally, abdominal segments two to seven, inclusive, bear 1 + 1 combs, each comb consisting of two (rarely three) macrochaetae between two small setae (fig. 12). On the eighth abdominal segment there is one (sometimes two) macrochaeta on the mesal side of the articulation of the stylus (figs. 5, 6). In the specimens most of the macrochaetae of the clusters and combs had fallen off, but were represented by their sockets, as shown in the figures.

Scales oval, orbicular, suboblong, subelliptical, etc., being very variable in form; very finely striate; pale brown or colorless.

Length, 5.5 mm.; width, 1 mm.

Eleven syntypes. Indefatigable, April 19th, under roots of *Bursera*, five males and four females, W. M. Wheeler (No. 2262). South Seymour, April 22nd, sifted from soil near beach, one male and one female, W. M. Wheeler (No. 2297).

In its generic characters this species is intermediate between *Isolepisma* Esch. and *Heterolepisma* Esch. It agrees with the former genus in its arched dorsum and long telson, and with the latter in its subquadrate pronotum, scarcely narrowed anteriorly, and the general character of its setal clusters and combs. It seems preferable to refer this species to *Heterolepisma*, rather than to erect a new genus for it.

H. intermedia is nearly related to the neotropical species *H. pampeana* Silv., recorded from Buenos Aires, Rio S. Cruz and Porto Piramides, and reported to be abundant on the pampas of Patagonia.

Plate IV. 9, *Heterolepisma intermedia*, right inner dorsal setal cluster of the third abdominal segment, × 370. 10, *Heterolepisma intermedia*, right outer dorsal setal comb of the fifth abdominal segment. The macrochaetae are represented only by their sockets, × 370. 11, *Heterolepisma intermedia*, right lateral setal comb of the third abdominal segment, × 370. 12, *Heterolepisma intermedia*, right ventral setal comb of the sixth abdominal segment, showing one of the two macrochaetae, × 175. 13, *Acrotelsa galapagoensis*, telson of female, × 25. 14, *Acrotelsa galapagoensis*, left maxillary palpus of female, × 25. 15, *Acrotelsa galapagoensis*, left labial palpus of female, × 20. 16, *Acrotelsa galapagoensis*, ventral aspect of extremity of abdomen of female, × 25. 17, *Acrotelsa galapagoensis*, ventral aspect of extremity of abdomen of male, × 34.

Acrotelsa galapagoensis Banks.

Lepisma galapagoensis Banks, 1901.
Proc. Wash. Acad. Sc., Vol. 3, pp. 541–543, *figs.* 47–50.

(Plate IV, figs. 13–17; Plate V, figs. 18–20).

This giant lepismid described by Banks was represented in the collection by five specimens, the study of which has enabled me to add certain details to the original description.

Dorsally dark brown; mottled with dark brown, pale brown or grayish scales; body color white. Ventrally silvery white; or with yellowish white thorax and brownish abdomen. Legs golden brown proximally, pale yellow distally, with brown scales and yellow or yellowish brown setae. Head short and broad, rounded anteriorly; eyes not prominent. Thorax broader than the abdomen; pronotum rounded laterally, narrowing anteriorly. Abdomen narrowing slightly posteriorly. Tenth urotergite (fig. 13) elongate-subtriangular, apically acute, fringed with stiff yellow setae. Antennae longer than the head and body by one third; annulated with dark brown and white. Maxillary palpi (fig. 14) white with brown setae (female) or brownish with last three segments darker (male); with segments in relative lengths as 3:5:7.5:7:8 (female) or as 3:5:7:5:13 (male). The fifth segment in Bank's figure is probably abnormally short. Labial palpi (fig. 15) white with brown setae (female) or pale brown (male); last segment foot-shaped. Cerci and pseudocercus dark brown, annulated with white or yellowish white; the former three fourths as long as the head and body; the latter somewhat longer than the cerci. Styli (figs. 16, 17) seven pairs, on third to ninth abdominal segments; slender, white with brown setae (female) or brownish with golden brown setae (male). Dorsal and ventral valves of ovipositor subequal in length. Ventral valves (fig. 16) finger-shaped in ventral aspect, obliquely pseudosegmented, extending almost as far as the adjacent paramedian process of the ninth gonocoxite; this process (figs. 16, 17) tapering uniformly to an acute apex, and extending two fifths as far as the adjacent (last) stylus in the female, and one third as far in the male. Eighth ventral segment divided in the female, forming a pair of gonocoxites (fig. 16); undivided in the male (fig. 17). Seventh ventral segment (fig. 18) undivided, rounded posteriorly, without a median fold on the posterior margin. Parameres of male (fig. 17) subclavate, extending as far as the adjacent paramedian processes of the ninth abdominal segment.

Stiff, minutely fringed setae, apically bilobed (fig. 19) occur abundantly; most of them being yellow, though some are brown. On the head are "fourteen tufts of hair seen from above as follows: one in front of each eye, one behind each antenna, two above base of each antenna, one in front of each antenna, and two each side on anterior margin; below on clypeus there are other tufts" (Banks). Marginal clusters of these bilobed setae occur on the thoracic terga, occupying the yellowish pores mentioned by Banks. Each thoracic notum bears seven or eight lateral clusters of setae, the last cluster being at the postero-lateral angle, and bears in addition, near the posterior margin, 1 + 1 dorsal combs. The combs are simply clusters in which the setae are in alignment, as in figure 17. On the abdomen, in dorsal aspect, the following setal combs or clusters are visible: abd. 1, 2 + 2; abd. 2–7, 3 + 3; abd. 8, 2 + 2; abd. 9,

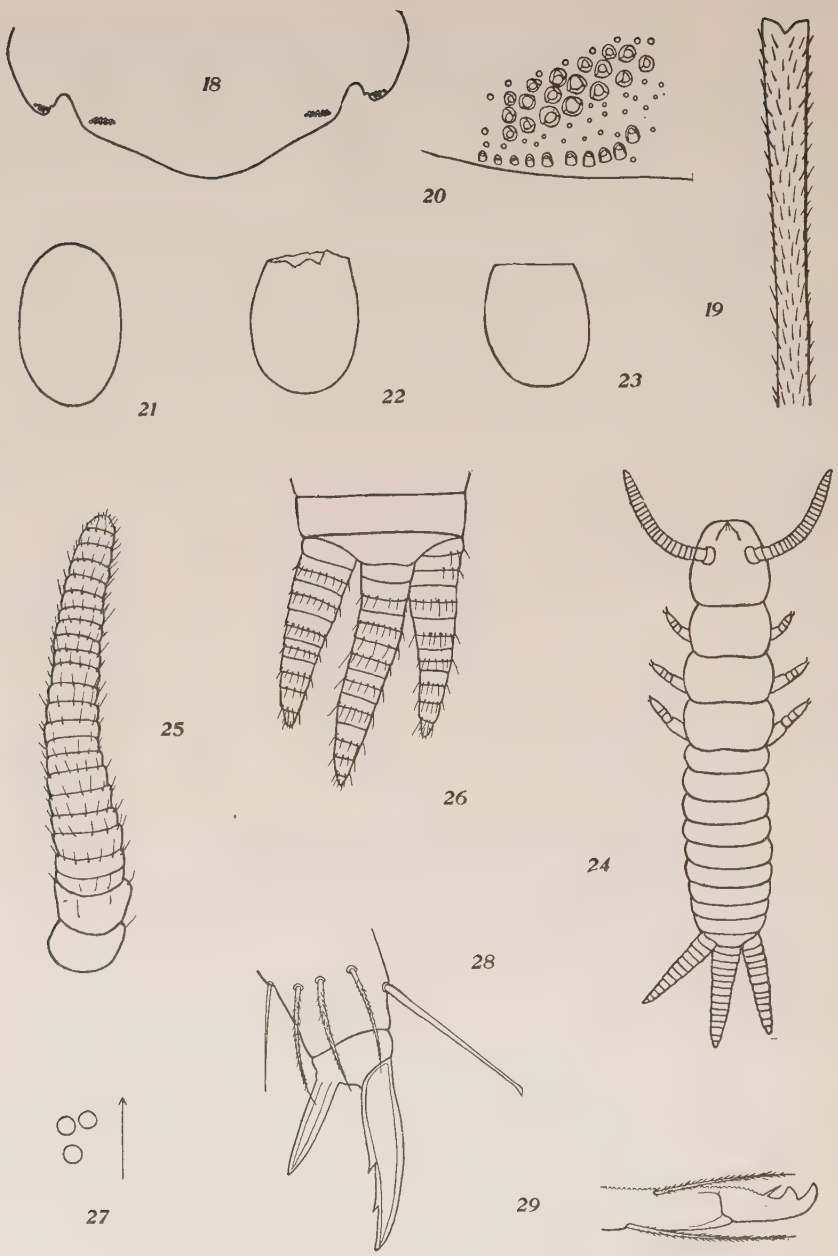

Plate V. 18, *Acrotelsa galapagoensis*, ventral plate of seventh abdominal segment of female, × 14. 19, *Acrotelsa galapagoensis*, seta from front, × 240. 20, *Acrotelsa galapagoensis*, setal sockets of left outer dorsal comb of fourth abdominal segment, × 110. 21, *Lepismid*, outline of egg, × 15. 22, *Lepismid*, egg shell, × 15. 23, *Lepismid*, egg shell, × 15. 24, *Lepismid*, nymph, reconstructed from exuviae, × 25. 25, *Lepismid*, right antenna of nymph, × 100. 26, *Lepismid*, telson, cerci and pseudocercus of nymph, × 53. 27, *Lepidocyrtus intermixtus*, eyes of left side, × 320. 28, *Lepidocyrtus intermixtus*, right hind foot, × 1260. 29, *Lepidocyrtus intermixtus*, left mucro, × 1260.

1 + 1; abd. 10, 3 + 3 large marginal clusters and sometimes a small fourth distal pair (fig. 13). Of these just enumerated, lateral clusters occur on abd. 1–9 inclusive. Most of the clusters and combs contain many macrochaetae (fig. 20). The thoracic sternites are fringed with stiff yellow setae; the prosternum has three combs on each side, the meso- and metasternum each two. On the abdomen, ventrally, there is a setal cluster on each side of the articulation of each stylus on abd. 3–7, inclusive (fig. 18), the mesal clusters forming combs; and a mesal comb on abd. 8 (figs. 16, 17).

Scales simple, varying greatly in form: obovate, ovate, suboval to orbicular, etc., very minutely striate. The scales are sometimes colorless but usually pigmented with brown, especially apically; the fine close striae give interference colors of violet or blue.

Length of largest female, 18 mm.; width of mesonotum, 5 mm.; length of antennae, 25 mm.; of a lateral cercus, 15 mm.

Length of largest male at hand, 9 mm.

Six specimens, collected by Prof. W. M. Wheeler. Two females, Indefatigable, April 8th, 22nd, under stones on beach (Nos. 2188, 2306). One female, Daphne Major, April 24th (No. 2333). One male, South Seymour, April 25th, (No. 2423). Two males, James Island, April 5th (pinned).

The types described by Banks were taken on Hood Island in May.

A. galapagoensis is closely related to the West Indian species *A. gigantea* Esch., as regards the number of styli, the form of the labial palpus, etc., but differs from the latter species in regard to the color of the legs, styli and palpi, and in some other respects, particularly in having no median fold on the posterior border of the seventh ventral plate of the female.

The genus *Acrotelsa* contains the largest known lepismids. *A. gigantea* Esch. attains a length of 21 mm., and *A. galapagoensis* Banks, 20 mm.

Lepismid Eggs and Nymphs.

(Plate V, figs. 21–26).

Mr. Beebe collected, on South Seymour Island, April 22nd, hundreds of egg shells, which were at the time correctly identified by Professor Wheeler as lepismid. These were found under a slab of lava rock upon a small amount of earth. They were not attached to the stone but were loose, on and in the thin layer of soil.

These were shells of eggs that had hatched. Among them was rarely an unhatched egg, like that represented in figure 21. The shells are brownish yellow, the eggs broadly elliptical to subovate, and smooth externally. At one end, the narrower end of the subovate egg, the nymph escapes by pushing off a cap, leaving usually an irregular torn margin (fig. 22), though occasionally a straight edge (fig. 23), indicating a pre-existing line of weakness. The eggs average 1.45 mm. in length by 0.9 mm. in width. Frequently several egg shells are held together in a cluster by means of a gelatinous substance.

Among the egg shells were hundreds of minute lepismid skins, and occasionally a skin of the same kind could be seen within an egg shell. These skins had all belonged to nymphs of practically the same size and were probably exuviae of the first molt. The more complete skins showed a median dorsal split extending always the length of the head and thorax and frequently to the end of the abdomen. Though all the skins were more or less distorted and fragmentary, it was not difficult to reconstruct from them the form of the nymph, shown in figure 24.

As little is known about the early stages of lepismids, except what Heymons has recorded, it is worth while to describe this immature form, in comparison with adult lepismids.

The head is very large in proportion to the body. The thoracic segments are equal and simple, and the thorax but slightly broader than the abdomen; the latter being only one fourth longer than the thorax, with parallel sides scarcely narrowing posteriorly, and with segments mostly subequal. There is no imbrication of the abdominal sclerites, which simply meet, edge to edge. In the exuviae, at least, there are no traces of external organs of reproduction, with the exception of a median slit dividing the ninth ventral segment into halves almost to the posterior border of the eighth. The mouth parts are peculiar, forming a cone; there being an enclosing ventral sheath (probably the labium, as in Hemiptera) which is split along the median dorsal line—a condition that I have not as yet encountered in any adult lepismids. The antennae (fig. 25), inserted close together, are short and stout, only three fifths longer than the head, with twenty-four segments (the adults would have very many), the segments being mostly subequal in length. The cerci and pseudocercus (fig. 26) are slightly longer than the head, stout, and elongate-conical; the cerci having thirteen segments (rarely twelve) and the pseudocercus fifteen (the adults would have many more). There are no traces of styli. The legs have short stout segments, like those of an embryo; the tarsus bearing three claws, as in all lepismids. The setae of the body and legs are sparse, short and stiff. No scales are present, though the cuticula is elevated into minute, closely-set papillae.

Characters of generic value are practically absent in these nymphs; though they might possibly be found in the mouth parts. The form of the telson is one common to many genera of Lepismidae.

Clues to the identity of these nymphs were found, however, in two cast skins of well-grown individuals that occurred among the egg shells and small exuviae. These two larger skins were far from perfect, but showed the same peculiar kind of mouth parts and the same form of telson found in the smaller skins; and exhibited, moreover, well developed setal combs, in which the macrochaetae were still in place. These large setae were exceptionally long, bilobed apically, and strongly fringed. The large skins showed lepismid eyes, of which I did not detect any traces in the small exuviae; corneae may have been present in the latter, but if so, were obscured by foreign matter and by the distortion of the cuticula. There were seven pairs of styli.

The eggs and nymphs do not belong to either of the two species of lepismids described here; for the form of the telson excludes them from *Acrotelsa* and the fringed setae from *Heterolepisma*. The number of dorsal setal combs, the number of macrochaetae in each comb (inner dorsal, 2; outer dorsal, 4 or 5; lateral, 4 or 5) and the number of styli, indicate that the species belongs in or near the genus *Ctenolepisma*.

Lepidocyrtus intermixtus sp. nov.

(Plate V, figs. 27–29).

White throughout (excepting the black eye-spots), or white with a faint pigmentation of irregular spots of blue, frequently surrounding colorless round or oval spots made by the hypodermal nuclei. The pigment consists of minute round separate granules of blue, and when present occurs scatteringly on the following regions: head, dorsally, laterally and ventrally; an imperfect V-shaped line connecting the ocular spots anteriorly; mesonotum, antero-dorsally and laterally; metanotum, dorsally and laterally; abd. 1–3, a feeble pigmentation dorsally and laterally; abd. 4, dorsally except on anterior fourth, laterally, also ventrally on each side of the middle region; abd. 5, a little pigmentation dorsally. Antennae white throughout, or all segments spotted with blue but colorless apically. Legs slightly pigmented basally, otherwise colorless. Furcula white throughout.

Eyes (fig. 27) three on each side, equal, not on separate pigment spots, but on a common black spot, which is small and roughly elongate-triangular. Antennae slightly longer than the head, with segments in relative lengths about as 10:16:17:33; first two segments subcylindrical, third subclavate, fourth narrowly elliptical. Mesonotum covering the prothorax but not projecting over the head; with a dense anterior fringe of divergent setae, feebly clavate and naked. Fourth abdominal segment more than twice as long as the third (from 2.1 to 2.6 times as long). Fifth and sixth abdominal segments with curving fringed setae. Claws minute. Unguis (fig. 28) almost straight, without lateral teeth, with inner margin subequally bidentate, there being one tooth in the middle and an-

other one fourth from the apex. Unguiculus extending as far as the proximal tooth of the unguis, straight, sublanceolate. Tenent hair feebly knobbed. Furcula attaining the ventral tube. Manubrium and dentes subequal in length, with short curved fringed setae dorsally, and scales ventrally. Dentes crenulate dorsally on the proximal three fourths, the distal fourth bearing minute serrations, which are continued beyond the dens on the dorsal side of the mucro (fig. 29). Mucro minute, tridentate; apical and anteapical teeth subequal; proximal tooth oblique as usual, spine-like, in the middle of the dorsal margin. A few long fringed setae extend from the dens nearly or quite to the end of the mucro.

A dorsal pair of erect subclavate fringed setae was seen on the second abdominal segment of one specimen, and such sensory setae doubtless occur normally on other segments also. Very few scales had remained on the specimens; these scales were oval or elliptical, with obscure, extremely minute and close, short, irregular, longitudinal striae. Maximum length of specimens, 1 mm.

Twenty-two syntypes. South Seymour Island, April 22nd. This little collembolan was taken incidentally by Dr. William Beebe; it appeared among the hundreds of lepismid egg shells that he collected.

This form, like a few other species of *Lepidocyrtus*, approaches the genus *Sira* as regards the shortness of the mesonotum. As the furcula bears ventral scales, however, the species is referred to *Lepidocyrtus*.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

HOMOPTERA OF THE WILLIAMS GALAPAGOS EXPEDITION.

By Herbert Osborn.

The few species of Homoptera submitted for examination were collected by William Beebe in the Galapagos Islands, and are interesting as bringing to light a species long ago described by Stål with some closely related forms, and also a species of *Jassus* not hitherto known from these islands. The Williams Galapagos Expedition was sent out by the Department of Tropical Research of the New York Zoological Society.

Jassus galapagoensis sp. nov.

Head broad, blunt; vertex, female, nearly twice as wide as long, narrower in male, faintly carinate; ocelli close to border, not sunken in pits; front narrow, rather faintly carinate; clypeus twice as long as width at base, expanding toward tip. Pronotum a little longer than vertex, minutely granulate.

Genitalia: Female, last ventral segment three times as long as preceding; hind border scarcely produced, faintly sinuate, strongly carinate. Male, plates very slender, widened a little toward tip, extended beyond tip of pygofer.

Color: Yellow, tinged with orange; border of front and middle of clypeus, orange or reddish. Pronotum and scutellum blackish, in the female with spots at anterior border of pronotum and borders of scutellum, yellowish; elytra mostly black in the male, but with broad discal stripe and claval nervures, blackish in the female; costa yellowish transparent—this including also most of outer apical areole; wings smoky; veins blackish. Beneath yellowish with black areas on the thorax and coxae; legs yellowish; tarsal claws blackish. In some individuals, especially in the males, there is a dense coppery or bronzy pruinose covering which gives the insect a greenish coppery appearance.

Length, female 8 mm.; male 6 mm.

Seven specimens, two females (type and paratype), four males (allotype and paratype), and one nymph, from Conway Bay, Indefatigable, Galapagos, April 1st, 1923, and James Islan, Galapagos, April 5th, 1923.

The females and males differ considerably in size, but agree closely in marking, except the extent of blackish on the elytra. There is however little question as to their belonging to the same species. The nymph has the vertex elongate, considerably longer than width at base, the borders of the front cinnabar red, extended on basal half of clypeus. The prothorax and mesothorax with large fuscous spots; anterior wing pads mostly fuscous; abdominal seg-

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ment greenish yellow with fuscous patches at the sides. Beneath greenish; borders of abdomen tinged with reddish; legs greenish; femora with fuscous patches and a dark annulus near tip. The wing pads extend to base of second abdominal segment which would indicate a third or fourth instar. This species seems most closely related to some of the South American forms, especially *auratus* Fab., but does not agree with any species known to me, and it seems probable that it was derived from a South American source at so remote a period as to have formed a distinct species.

Genus *Philatis* Stål.

Rio Jan. Hmip. p. 68, 1858.

Philatis productus Stål.

Mycterodus productus Stål. *Eugenies Resa, Omkring, Jorden*, p. 278, 1853.

Stål described this species as from "Insulae Galapagenses, Callao, et Panama." Specimens from Tower Island agree very perfectly with his description. The female has the last complete ventral segment deeply indented each side of the middle and emarginate toward the border with the succeeding segment either hidden at the middle or divided by the base of ovipositor. The pygofer is short, compressed, upturned, the sub-anal plate flattened, narrowed posteriorly and bluntly rounded at tip. Male terminal segment twice as long as preceding; hind border concave; lateral angles reaching above base of the plates; plates closely appressed or fused, deeply spoon-shaped, narrowed to blunt tips extending beyond tip of pygofer.

Length 5 mm.

Two specimens, male and female, Tower Island, April 28th, 1923.

Philatis cinerea sp. nov.

Smaller than *productus* and distinctly grayish in color with minute fuscous punctations, a light gray patch on the disk of elytra and a series of whitish cross veins next the claval suture.

Head produced, but not distinctly carinate; margins of vertex slightly elevated; margins of front thin, slightly reflexed. Pronotum short, a little more than half as long as vertex, narrowed at sides; elytra broad, convex; hind border obliquely truncate, nearly right-angled at tip of clavus; wings rudimentary.

Genitalia: Female, last complete segment indented each side near the middle, sinuate at the sides; succeeding segment with sides separated by ovipositor; pygofer short, compressed, scarcely produced upward at tip; sub-anal plate rather long; margins reflexed; tip bluntly rounded. Male, last ventral segment twice as long as the preceding; hind border truncate; plates fused; broadly carinate; tip contracted, blunt, exceeding pygofer.

Color: Dark gray; vertex and front tinged with green; body sprinkled with minute fuscous dots; a broad whitish patch on disk of elytra and a light area

bordering the clavus; outer border between veins distinctly fuscous. Abdomen above smoky, beneath somewhat greenish.

Length, to tip of elytra, female 5 mm.; male 4.5 mm.

Five specimens, three females, two males, Tower Island, April 28th, 1923.

Philatis major sp. nov.

Larger than *productus*, with carina less distinct, and color more uniformly pale testaceous.

Head triangular; vertex depressed, without distinct carina at the middle; borders slightly raised; front without distinct carina; lateral margins thin, slightly expanded. Pronotum about half as long as vertex, angularly emarginate behind; elytral veins conspicuous, reticulate; costa broadly rounded; wings rudimentary.

Genitalia: Female, last complete segment shallowly indented near the middle, deeply sinuate each side; pygofer compressed, curved. Male, last ventral segment equal to preceding, these about three times as long as basal segments; plates narrowed, closely appressed, broadly carinate each side; tips blunt, extended beyond tip of pygofer.

Color: Pale testaceous; veins in the female faintly margined with fuscous; the costal and apical margin minutely dotted with fuscous. Abdomen of male below faintly tinged with greenish.

Length, to tip of elytra, female 6.5 mm.; male 5.5 mm.

Four specimens, two females and two males from Conway Bay, Indefatigable, Galapagos, April 1st, 1923.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

BIRD-INFESTING MALLOPHAGA COLLECTED BY THE WILLIAMS GALAPAGOS EXPEDITION.

By H. E. Ewing.

Bureau of Entomology, United States Department of Agriculture.

(Figure 12).

Our knowledge of the Mallophaga of the Galapagos Islands dates from 1902 when Professor V. L. Kellogg and S. I. Kuwana published their extensive paper (*Proc. Wash. Acad. Sci.*, Vol. vi, pp. 457–499, pls. xxviii–xxxi) on the biting lice collected by the Hopkins Stanford Galapagos Expedition, 1898–1899. The louse specimens were collected by R. E. Snodgrass, at present of the Bureau of Entomology, whose researches on the morphology of the biting lice and several other orders of insects are well known. Snodgrass obtained no less than 43 different species from the islands. Later (1906) Professor Kellogg published another paper (*Trans. Am. Ent. Soc.*, Vol. xxxii, pp. 315–324) dealing with the Mallophaga of these islands and the Revillagigedo Islands. This paper was based on a collection made by Rollo Beck in 1901, which included fifty-four species.

During the summer of 1923, Mr. William Beebe sent to the writer a small collection of bird-infesting Mallophaga obtained by the Williams Galapagos Expedition of the New York Zoological Society during the same year. Although the number of species sent in by Mr. Beebe is small yet the collection is of considerable interest as it contains a record (new species) from the flightless cormorant (*Nannopterum harrisi*).

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LIST OF SPECIES, WITH DESCRIPTIONS OF A NEW SPECIES AND A NEW VARIETY.

Family MENOPONIDAE Mjöberg.

Genus *Menopon* Nitzsch.

M. auri-fasciatum Kellogg.

New Mallophaga, Pt. III, *p.* 43, *pl.* iv, *fig. 5* (1899).

From *Fregata aquila.* Three females and one nymph.

M. navigans Kellogg.

New Mallophaga, Pt. I, *p.* 156, *pl.* xiv, *figs.* 4 *and* 5 (1896).

From *Sula nebouxii,* two females and one male; and from the same host (second lot), four females and one male.

Genus *Colpocephalum* Nitzsch.

C. unciferum Kellogg.

New Mallophaga, Pt. I, *p.* 140, *pl.* xii, *figs.* 1–3 (1896).

From *Pelecanus* sp. Two females.

Family PHILOPTERIDAE Burmeister.

Genus *Philopterus* Nitzsch.

P. breviformis (Kellogg and Kuwana).

Proc. Wash. Acad. Sci., Vol. iv, *p.* 463, *pl.* xxviii, *fig.* 3 (1902).

From *Progne modesta.* One female specimen.

Genus *Esthiopterum* Harrison.

E. helleri (Kellogg and Kuwana).

Proc. Wash. Acad. Sci., Vol. iv, *p.* 479, *pl.* xxx, *fig.* 3 (1902).

From *Sula piscator.* Three male specimens.

E. nannopteri sp. nov.

Fig. 12

Female: Head stout, subtriangular; forehead subconical, sides very slightly concave; postantennal region longer and broader than forehead; temporal lobes large, evenly rounded; posterior margin of head slightly convex. Clypeus broader than long, signature shield-shaped, slightly longer than broad and clearly outlined. Trabeculae minute. Mandibles stout, bifid at tip. Eyes small but with projecting corners and jet black pigment spots. Lateral margins of forehead each with six small setae three of which are situated on clypeal region. Temples each with a very long seta at the posterior angle and three minute prickles on lateral margin. Antennae about half as long as head; second segment longest; last segment tipped with minute setae.

Thorax about as long as head but not as wide. Prothorax fully twice as broad as long and bare above except for a pair of long and a pair of small setae at each of the posterior angles. Meso-metathorax twice as long as prothorax and broader, sides divergent posteriorly; each posterior angle with a tuft of four

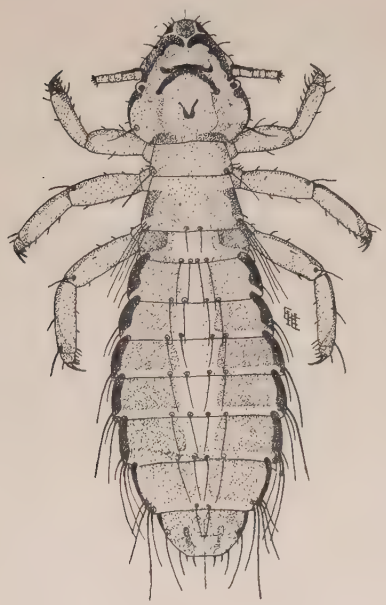

FIG. 12.—*ESTHIOPTERUM MANNOPTERI* sp. nov., female, × 30.

long, unequal setae, some of which are longer than the segment itself. Legs large and conspicuous; the posterior pair, which is slightly the largest, reaches to the middle of abdomen. Claws unequal, those of the second legs are nearly equal. Femora slightly swollen and subequal in length to the tibiae.

Abdomen swollen and broadest at the fourth or fifth segment; pleural bands dark brown, almost black; tergal bands broadly interrupted at the middle and not quite as broad as the segments, brown in color. Above, the abdomen bears four submedian rows of long setae and on the posterior corners of each segment is one or more long setae, the number being greatest on the next to the last segment which bears a tuft of five such setae at each posterior corner. The first segment of the abdomen is the shortest, the second is longer than either I, III or IV, the last is almost as long as broad.

Length, 2.3 mm.; greatest width, 0.8 mm.

Nymphs: Similar in shape to adult, but smaller and paler. Smaller nymphs without abdominal bands. Last nymph with dark brown pleural markings.

Length of last nymph, 2.0 mm.; greatest width, 0.6 mm.

Type host and type locality: From *Nannopterum harrisi*, Galapagos Islands.

Type: Cat. No. 23764, U. S. N. M.

Described from one female and four nymphs. Holotype a female.

This is the first record of an *Esthiopterum* species from the flightless cormorant, and as far as the writer has been able to determine is the only Mallophagan record from this remarkable and rather recently discovered bird. Snodgrass obtained some of these cormorants in the Galapagos but no lice from them.

Beck in his trip to the Galapagos in 1901 took some of these flightless cormorants, two of which are now mounted specimens in the United States National Museum. The Mallophaga which he collected this year were worked up by Professor Kellogg, yet in Kellogg's paper I find no mention of any lice from the flightless cormorant. Also this host is not mentioned in the list of hosts of the Mallophaga known from the birds of the Galapagos Islands published earlier by Kellogg and Kuwana.

The species is distinctive and does not resemble any of those previously listed from the Galapagos. However, it is closely related to *E. farallonii* (Kellogg), described from the Farallone Cormorant, *Phalacrocorax dilophus albociliatus*, taken at Monterey Bay, California. It differs from Kellogg's species in being smaller, having a decidedly wider head, longer setae on the abdomen and much larger legs, and, probably most important of all, in not having the median abdominal blotches. Although of about the same dimensions as *E. acutifrons* (Rudow), taken from *Phalacrocorax sulcirostris*, the specimens from *Nannopterum* differ from Rudow's species decidedly in the shape of the head and in various body dimensions.

E. pelagicum (Denny).

British Anopleura, p. 173, *pl.* xiv, *fig.* 2 (1842).

From a petrel. One male specimen.

E. potens var. **minor,** var. nov.

Similar to the type form taken from *Sula piscator* in the Galapagos and described by Kellogg and Kuwana. It differs from the species described by these authors chiefly in size. Males of var. *minor* are but little over 3 mm. in length, while the length given by Kellogg and Kuwana for *potens* proper is 4 mm. The females also of *minor* are somewhat smaller than those of the type form. Specimens of *minor* are more strongly banded than represented in the drawing of *potens* given in Kellogg's and Kuwana's paper.

Type host and type locality: From *Sula nebouxii* taken in the Galapagos Islands.

Type slide: Cat. No. 23765, U. S. N. M.

Described from a male, two females and a nymph in one lot and from two males, two females and two nymphs of another lot. All specimens from *Sula nebouxii* taken in the Galapagos.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

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DIPTERA OF THE WILLIAMS GALAPAGOS EXPEDITION.

By Charles W. Johnson.

(Figures 13–14).

This report is concerned with a collection of Diptera made by William Beebe on the Williams Galapagos Expedition. This was sent out under the auspices of the Department of Tropical Research of the New York Zoological Society.

The first Diptera described from the Galapagos Islands were collected by Charles Darwin, while on the memorial cruise of H. M. S. *Beagle* around the world. The specimens were collected from September 15th, to October 20th, 1835, and nine species were described by Francis Walker in his "List of Diptera" in 1849. During the cruise of the Swedish frigate *Eugenies*, the Galapagos were again visited, and the Diptera collected,—numbering twelve species,—were described by C. G. Thomson in 1868. The British S. S. *Petrel* visited the islands in 1875, and among the insects were two Diptera recorded by F. Smith in the "Proceedings of Zoological Society of London for 1877, page 84." During the cruise of the U. S. S. *Albatross* in 1887 and 1888, these islands were again visited, but only one undetermined species of Culex was reported.

In 1898–1899 there was an expedition known as the Hopkins Stanford Galapagos Expedition. Among the insects collected by Mr. R. E. Snodgrass, the entomologist, were thirty-five species of Diptera, that were recorded by D. W. Coquillett.[1] Of these, twenty-four had not previously been reported from the islands and of these ten were described as new. The present paper deals with twenty-eight species, of which thirteen have not been before recorded. Deducting synonyms it makes a total of fifty species of Diptera recorded from the Galapagos Including three undetermined species, the number apparently peculiar to the islands is thirty-eight.

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[1] *Proceedings Washington Academy of Sciences*. Vol. III, pp. 371-379, 1901.

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1 2

FIGS. 13–14. *GALAPAGOMYIA LONGIPES* gen. et sp. nov.
Fig. 13. Wing. Fig. 14. Front leg.

Family CHIRONOMIDAE (The Midges).

Chironomus sp.

One imperfect specimen in alcohol, South Seymour, April 22nd.

Ceratopogon galapagensis Coquillett.

C. galapagensis Coquillett, *Proc. Wash. Acad. Sciences*, Vol. III, *p.* 372, 1901.

Four specimens in alcohol, South Seymour, April 20th.

Tanypus sp.

One imperfect specimen in alcohol, South Seymour, April 22nd.

Galapagomyia longipes gen. et sp. nov.

Male: Head yellowish, *the prominent facial protuberance bearing long black hairs*, the proboscis nearly as long as the face, *palpi large*, yellow with black hairs, antennae yellow, scape about three times the diameter of the first joint of the flagellum, the joints of the latter *six in number*, are *rounded* and each bear three verticilli, the terminal joint, which is about double the length of the preceding joint, tapers to a point. Thorax brown, with three dorsal rows of hairs, pleura yellow, with a large, brown, central spot, scutellum brown. Abdomen with both the dorsal and ventral segments brown, margined posteriorly with yellow, hypopygium comparatively small, in form similar to a *Diamesa*. *Legs long, femora yellow, thickened at the basal half, tibiae brown, the front tibiae about one-fourth longer than the femora*, the others but slightly longer, tarsi brown, *the metatarsi about one-half the length of the tibiae, the other joints of the tarsi together not quite as long as the metatarsi, fourth joint less than one-half the length of the third*, legs covered with fine black hairs, halterers yellow, wings brownish hyaline, the costa, first and second veins hairy. Length, 4 mm.

Female: similar to the male but only 3 mm. in length. Ovipositor short. The eggs show distinctly through the thin distended sides of the abdomen.

Two specimens in alcohol, Seymour Bay, Indefatigable, April 26th.

The italicized portions of the above description represent the generic characters.

Family TIPULIDAE (The Crane-flies).

Dicranomyia sp.

One specimen, Conway Bay, Indefatigable, April 1st.

The discal cell is open, the venation resembling that of *D. floridana* O. S. The abdomen is missing and it would be inadvisable to describe it without the male genitalia.

Family CULICIDAE (The Mosquitoes).

Aedes taeniorhynchus portoricensis (Ludlow).

Taeniorhynchus niger Gibs (*non* Theobald) *Jour. Trop. Med.*, Vo 7, *p.* 382, 1904.
Culex portoricensis Ludlow, *Can. Ent.*, Vol. 37, *p.* 386, 1905.
Aedes (*Taeniorhynchus*) *portoricensis* Dyar. *Proc. U. S. Nat. Mus.*, Vol. 62, *p.* 88, 1922.

Two mounted specimens, Conway Bay, Indefatigable, April 1st, and some forty-eight specimens in alcohol, from Seymour Bay, Indefatigable, South Seymour and Tower, April 18th to 28th.

This is undoubtedly what Coquillett recorded from the Galapagos as *Culex taeniorhynchus*. Differs from *taeniorhynchus* only in having the last hind tarsal joint strongly blackish tipped. The habits are the same as those of *taeniorhynchus* of which this is to be considered a local race." (Dyar). The larva were in "salt water tide pool," at Eden, April 2nd.

Family TABANIDAE (The Horseflies).

Tabanus vittiger Thomson.

T. vittiger Thom., Eugenies Resa, p. 451, 1868.

Four specimens, Conway and Seymour Bays, Indefatigable, April 1st and 22nd.

This species resembles the common *T. lineola* Fabr.

Family BOMBYLIIDAE (The Bee-flies).

Villa primitiva (Walker).

Anthrax primitiva Walker, *List Diptera*, II, 257. 1849.
Anthrax lateralis Thomson, *Eugenies Resa, p.* 482, 1868. *non* Say 1823.
Anthrax nudinscula ? Coquillett, *Proc. Wash. Acad. Sciences*, III, 373, 1901. *non* Thomson.

One specimen, Conway Bay, Indefatigable, April 1st.

The description by Walker seems to agree with this species, and as Thomson's name is pre-occupied I have adopted it. Coquillett placed *A. lateralis* Thomson doubtfully as a synonym of *A. nudinscula* Thomson, described from Panama, but the description does not substantiate this.

Villa tincta (Thomson).

Anthrax tincta Thomson, *Eugenies Resa, p.* 483, 1868.

One specimen, Seymour Bay, Indefatigable, April 22nd.

The specimen is rubbed, but from the form of the head and color of the wings I can only refer it to this species.

Family ASILIDAE (The Robber-flies).

Ommatius marginellus Fabricius.

One specimen, Conway Bay, Indefatigable, April 1st.

This species was recorded from James by Coquillett. The specimen before me is a female and therefore the determination is somewhat doubtful, as there are species in which the costa of the male is not thickened, as for example, *O. saccas* Walker of Jamaica.

Family DOLICHOPODIDAE (The Long-legged Flies).

Asyndetus versicolor sp. nov.

Male: Face with whitish pubescence, front metallic green, palpi black, antennae black, first joint about twice the length of the second, third joint rounded and partly covered by the second, arista about as long as all of the three joints together, thickened at the base. Thorax and scutellum metallic green, covered with a thin yellowish pollen. Abdomen bronze black, with a strong purplish reflection, the first segment and a wide posterior margin on the other segments greenish, which in certain lights show as whitish pollinose spots on the sides of the second, third and fourth segments. Legs greenish black, the front coxae each bearing a pair of long bristles projecting forward. Halterers yellow, wings hyaline, veins dark brown. Length, 3 mm.

One specimen, South Seymour, April 23rd.

Family PHORIDAE (The Hump-backed Flies).

Aphiochaeta scalaris (Loew).

Phora scalaris Loew *Cent.*, VII, *p.* 100, 1869.

One specimen, Tower, April 23rd.

Described from Cuba, it seems to be a widely distributed tropical species.

Family SYRPHIDAE (The Flower-flies).

Baccha clavata (Fabricius).

Syrphus clavata Fabr., *Ent. Syst.*, IV, 298, 1775.
Baccha fascialis Thomson, *Eugenies Resa, p.* 504, 1868.

Two specimens, South Seymour, April 23rd.

A widely distributed tropical and subtropical species.

Family SARCOPHAGIDAE (The Flesh-flies).

Wohlfahrtia inoa (Walker).

Sarcophaga inoa Walker, *List Diptera*, IV, 832, 1849.

Three specimens, Conway and Seymour Bays, Indefatigable, April 1st, and 22nd.

This species is readily recognized by its prominent epistoma and pubescent aristae, the abdomen has four rows of uniformly pollinose spots on a permanent black ground, third vein of the wings hairy at the base, almost to the cross vein. This is referable to the genus *Wohlfahrtia*, although there are some authors who would erect a new genus for it without wincing.

Sarcophagula occidua (Fabricius).

Musca occidua Fabr., *Ent. Syst.*, IV, 315, 1794.
Sarcophagula occidua Aldrich, *Sarcophaga and Allies*, 40, 1916.

One specimen, Daphne Major, April 22nd.

A widely distributed tropical species.

Sarcophaga violenta Walker.

S. violenta Walker, *List Diptera*, IV, 826, 1849.

One specimen, South Seymour, April 23rd.

The specimen is a male a little larger (14 mm.) than the measurement

given by Walker, but otherwise agreeing with the description. It was recorded by Coquillett from Albemarle.

Sarcophaga reversa Aldrich.

S. reversa Aldrich, *Sarcophaga and Allies*, 127, 1916.

Two male specimens, South Seymour, April 23rd.

This has a wide distribution and the specimens agree so well with the description and figure of the hypopygium, that there is little doubt that they represent this species.

Sarcophaga obtusifrons Thomson.

S. obtusifrons Thomson, *Eugenies Resa*, 536, 1868.

One specimen in alcohol, Seymour Bay, Indefatigable, April 23rd.

Family MUSCIDAE.

Cochliomyia macellaria (Fabricius).

Musca macellaria Fabr., *Syst. Ent.*, *p.* 776, 1775.
Musca phanda Walker, *List Diptera*, IV, 869, 1849.
Lucilia quadrisignata Thomson, *Eugenies Resa*, *p.* 544, 1868.
Compsomyia macellaria, E. L. Arribalzaga, *Anales Soc.*, *Cien. Argentina*, X, *p.* 70, 1880. Williston, *Proc. U. S. Nat. Mus.*, XII, 203, 1889.
Chrysomyia quadrisignata Coq. *Proc. Wash. Acad. Sci.*, III, 375, 1901.
Cochliomyia macellaria Towns. *Jour. Wash. Acad. Sci.*, V, 646, 1915.
Callitroga macellaria Johns, *Bull. Amer. Mus. Nat. Hist.*, XLI, 439. 1919.

One specimen, Conway Bay, Indefatigable, April 1st.

The specimen agrees with the descriptions of both Walker and Thomson and I find no character to separate it from the common and widely distributed "Screw-worm fly" *C. macellaria* Fabr. The synonymy of this species is large, although some of the twenty-six species placed there by Arribalzaga and Williston will ultimately prove to be good species when more thoroughly studied. The *Musca ochricornis* Wied., recorded from the Galapagos by F. Smith, may also represent this and not the Brazilian species, which is placed in the genus *Lucilia*.

Family ORTALIDAE.

Pareuxesta latifasciata Coquillett.

P. latifasciata Coq., *Proc. Wash. Acad. Sciences*, III, 376, 1901.
P. intermedia Coq., *l. c. p.* 377.

Seven males and seven females mounted and thirty-nine in alcohol, Tower, April 28th and 29th. "Hundreds of these flies clustered on gull excrement on the beach."

The color of the last two abdominal segments of the female varies from yellow to black, thus eliminating one of the characters used by Coquillett to separate *P. intermedia* from *P. latifasciata*. The width of the apical band on the wing is also variable, and it is impossible to draw the line between two-thirds as wide as the preceding hyaline interval in one, to one-half to three-fifths as wide in the other. I am therefore making *P. intermedia* a synonym.

The larvae were also collected. They are whitish, cylindrical, tapering anteriorly to a point. The hook-like mouth parts can be seen through the somewhat transparent tegument, the posterior end is truncated with two prominent

anal tubercles, ventral surface with low transverse ridges armed with rows of small chitinous spines. Length, 4 mm.

Pareuxesta obscura Coquillett.

P. obscura Coq., *Proc. Wash. Acad. Sci.*, III, 377, 1901.

Seven specimens, Daphne Major, April 22nd.

All the specimens are males, but the narrow bands of the wings readily separates it from *P. latifasciata*. One specimen has the bands obsolete, suggesting that possibly *P. hyalinata* Coq., with unmarked wings, may represent an extreme variation.

Family CHLOROPIDAE.

Hippelates pusio Loew.

H. pusio Loew, *Cent.*, X, 87, 1872.

Eight specimens (four in alcohol). Tower, April 28th, 29th.

"These flies were attracted to small abrasions on our hands or arms." This, and several other species, are often prevalent in the southern States and West Indies and largely instrumental in spreading an infectious disease known as "sore eye" or pink eye, see Scharz, "Hippelates plague." *Insect Life, Vol.* 7, *p.* 137, 1895.

Family DROSOPHILIDAE (The Pomace-flies).

Drosophila willistoni Sturtenant.

D. pallida Williston, *Trans. Ent. Soc. London* 1896, *p.* 415 (*non* Zetterstedi 1847).

D. willistoni Sturt., *Ann. Ent. Soc. Amer.*, IX, 327, 1916. *N. Amer. Drosophila*, *p.* 89, 1921.

One specimen, a female, in alcohol, South Seymour, April 22nd.

This seems to belong to this widely distributed species of tropical America.

Family AGROMYZIDAE.

Odinia williamsi sp. nov.

Male and female: Front, vertex and occiput grayish white, the front and vertex together forming a quadrangle, with three pairs of frontal orbital bristles, the two upper pairs reclinate, the lower pair convergent, the two pairs of vertical bristles reclinate, the lower pairs of ocellar bristles proclinate and the upper pair reclinate, a fine curved line extends from above the base of each antennae, upper half of the face black, the lower part and cheeks silvery white, vibrissae black, curved, with the basal half thickened, proboscis and palpi yellow, antennae with the second joint white above and black below, third joint about one and a half times as long as the second, yellow, with a broad longitudinal black stripe, arista black, base yellow. Thorax grayish with very small black spots at the base of each hair and bristle, one pair of acrostichals and four dorsocentrals, scutellum gray margined with brown and with four marginal bristles, abdomen gray, sparsely covered with black hairs, second, third and fourth segments each with pairs of brown subdorsal and smaller lateral spots. Femora black, tips of the femora and the tibiae and tarsi yellow, the posterior tibiae with a basal and subapical band of brown, halterers yellow, wings grayish,

with some thirty irregular black spots, that are surrounded by a narrow hyaline margin, tegulae white. Length, 3 mm.

Two specimens, South Seymour, April 22nd, 23rd.

This beautiful little fly is dedicated to the promoter of the expedition.

Family HIPPOBOSCIDAE (The Tick-flies).

Olfersia spinifera (Leach).

Feronia spinifera Leach, *Mem. Wernerian Nat. Hist. Soc.*, II, 557, *Tab.* 24, *f.* 1–3, 1817.

Eleven specimens, Tower, April 26th–28th.

Living upon the Frigate-bird (*Fregata aquila*).

Olfersia fossulata Macquart.

O. fossulata Macq., *Dipt. Exot.*, II, *part* 3, *p.* 434, 1843.

One specimen, Daphne Major, April 22nd. From the Brown Pelican, (*Pelecanus fuscus californicus*).

Recorded by Coquillett from Wenman. In the absence of specimens of the true *O. spinifer* I confused this with that species in my paper on the Diptera of the Bahamas (Psyche XV, 80, 1908). The species there recorded from the Cormorant and Booby are really this species, which measures only about 5–6 mm., while *O. spinifer* is from 8–9 mm. in length.

Ornithoponus americanus (Leach).

Feronia americana Leach, *l. c.* 557, *Tab.* 27, *f.* 1–3, 1817.
Ornithoponus americana Aldrich, *Ins. Ins. Menst.* , XI, 77, 1923.

Seven specimens, Seymour Bay, Indefatigable, April 22nd.

From a hawk, *Buteo galapagensis*. The specimens agree with this common and widely distributed species, which has been recorded from three species of *Buteo* and several of the owls.

Ornithoponus intertropicus (Walker).

Ornithomyia intertropica Walker, *List Diptera*, IV, 1144, 1849.
Olfersia intertropica Austen, *Annal, Mag. Nat. Hist.*, *ser.* 7, XII, 264, 1903.

Three specimens, Seymour Bay, Indefatigable, April 22nd.

From a heron, *Butorides sundevalli*. This species is closely allied to *O. albipennis* Say, which frequents the various herons of North America.

The types described in this paper are in the Laboratory of the Department of Tropical Research, New York Zoological Society.

ADDENDA.

In preparing the above paper I did not discover until after I had returned the galley proof that Dr. C. H. T. Townsend had described four new species,—the genotypes of four new genera, from the Galapagos. The descriptions are based on species previously recorded by Coquillett under other names in his report on the Diptera collected by the Hopkins Stanford Galapagos Expedition, but this fact is not stated by Dr. Townsend.

In the Insecutor Inscitiae Menstruus, vol. 5, p. 163, 1917, under the title "New Genera of Amobiinae" he describes *Opsophytopsis insularis*, Albemarle,

Jan. 18, 1899. Under "Genera of the Dipterous tribe Sarcophagini" (Proc. Biol. Soc. Washington, vol. 30, p. 196, 1917), he described *Prosthetocirca cana*, Narborough, Jan. 13–29, 1899, Albemarle, Jan. 1–18, 1899, *Gigantotheca galapagensis*, Albemarle, Jan. 18, 1899, and *Sarothromyiops cinctus*, Culpepper, Dec. 10, 1898. The types are in the U. S. National Museum. The only comment by Dr. Townsend relative to previously described species is,—"I can identify none of the above Galapagos forms with *Sarcophaga inoa* Walker."

It seems likewise difficult from the description to identify Dr. Townsend species. Therefore, a study of his types is just as essential as a study of those of Walker. In referring this complex to Dr. J. M. Aldrich he says:—"It is too bad you have not been enjoying these new genera for the past six years. There are a few good genera among them and I think *Prosthetocirca* is one, as the front rows do not diverge below, which is a pretty good character. Coquillett's specimen with his label *Sarcophaga inoa* was included by Townsend in the material of his *Prosthetocirca cana* but he did not mention that helpful item. I do not believe that Coquillett was correct because Walker's statement about the 'four hoary spots,' on each segment does not seem to agree. Townsend's *Sarothromyiops cinctus* is a synonym of *P. cana* as he could easily have ascertained if he had spread the genitalia. He separates the genera on anterior acrostichals which are in this case not of specific importance. We have several other specimens and one or two show a single acrostichal developed."

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

ARACHNIDA OF THE WILLIAMS GALAPAGOS EXPEDITION.

By Nathan Banks.

(Figures 15–18 incl.).

This expedition of the Department of Tropical Research under the auspices of the New York Zoological Society visited the Galapagos in April, 1923. The collection of Arachnida was made by William Beebe.

The Arachnida taken by the expedition are mostly those previously recorded from the islands. Four species are described as new. There are twenty-four species of spiders, five of mites, and two other Arachnids, thirty-one in all; nine of these are new to the fauna of the islands. Several of the additional species are common in the West Indies or Central America.

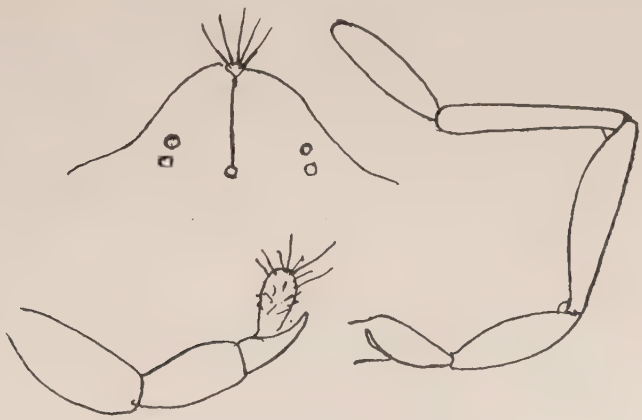

FIG. 15. *ERYTHRAEUS REMOTUS* sp. nov.
Crista, palpus and leg I.

Order ACARINA.

Family ERYTHRAEIDAE.

Erythraeus remotus sp. nov.

(Fig. 15).

Body about one and three-fourths times as long as broad, broadest in front of the third legs, but not much narrowed behind, in front with a broad, rounded lobe. Dorsum clothed with many short, spine-like hairs, some near the eyes

First form on press February 27, 1924

and crista longer. Cephalothorax not marked behind, two eyes each side, about diameter apart; crista short, enlarged at tip, and in front, where there are five long bristles. Legs very slender, front pair longer than the body, hind pair twice as long as body, second and third pairs about as long as body. Tarsus I is about two-thirds as long as the metatarsus, tarsus IV about two-fifths as long as the metatarsus, latter a little longer than the tibia. Palpus rather slender, penultimate joint stout, pointed, last narrowed at base, with several bristles at tip.

Length, 1.7 mm.

Under leaves on beach, Indefatigable, April 19th.

Atomus sp.

One specimen, Tower, April 27th.

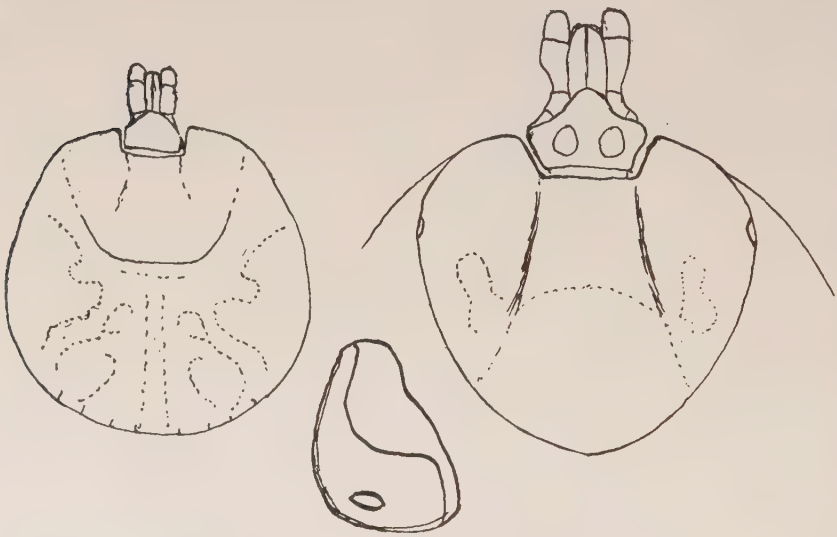

FIG. 16. *AMBLYOMMA WILLIAMSI* sp. nov.
Dorsum of male. Shield and stigmal plate of female.

Family IXODIDAE.

Amblyomma williamsi sp. nov.

(Fig. 16).

Male: red brown; a large pseudoscutum, and two radiate spots each side more yellowish; legs pale yellowish; venter reddish or yellowish. Body about as broad as long, in front rather shouldered, making the front broader than usual; pseudoscutum truncate behind, two raised spots each side and a median streak deeply and heavily punctured, except the median streak; the punctures separate; hind margin with a few hairs. Coxal tubercles very small, hardly noticeable on the hind coxae; hind tarsus tapering, without a spur below. Stigmata more slender than in female, the smooth area a little larger.

Female: red brown, more reddish beneath; legs pale yellowish; scutum with large pale spot on the hind lobe, and extending forward each side on the lateral lobes. Body with many short, stout hairs, not arranged in rows; no long hairs. Scutum rather broader than long, cordate, posterior sides evenly convex, finely, evenly and deeply punctured, the punctures separate; eyes small, hardly convex; porose areas rather large, nearly circular and about diameter apart; coxae with only very small tubercles. Stigmata subtriangular, with a long smooth area in front above, the stigmata proper being cone-shaped.

Length of male, 2.5 mm.; engorged female, 8 mm.; the scutum; 1.6 mm.

From Conolophus lizards, South Seymour, April 20th.

Differs from *darwini* by hairs not arranged in rows, and from *hirtum* by absence of long hairs.

Amblyomma darwini Hirst.

From Amblyrhynchus lizards on South Seymour, April 20th, and Indefatigable, March 28th and from Tropidurus lizards on Eden, April 2nd.

Ornithodoros talaje Guerin.

From Eden Island, April 2nd,; occurs in Central America.

Order SOLPUGIDA.

Ammotrecha solitaria Banks.

Several from Tower, April 27th, and Daphne, April 23rd.

Order SCORPIONIDA.

Hadruroides lunatus Koch.

Specimens from Eden, April 1st; South Seymour, April 20th and 22nd.; and Daphne, April 23rd.

Order ARANEIDA.

Family FILISTATIDAE.

Filistata fasciata Banks.

Immature from Tower, April 28th.

Family SCYTODIDAE.

Scytodes fusca Walck.

One from Indefatigable, April 4th; known from the West Indies.

Scytodes hebraica Simon.

One from Tower, April 28th; known from Central America and West Indies.

Sicaroides ultriformis Butler.

Immature from Eden, April 2nd, under stones.

Family DYSDERIDAE.

Ariadne tarsalis Banks.

One from South Seymour.

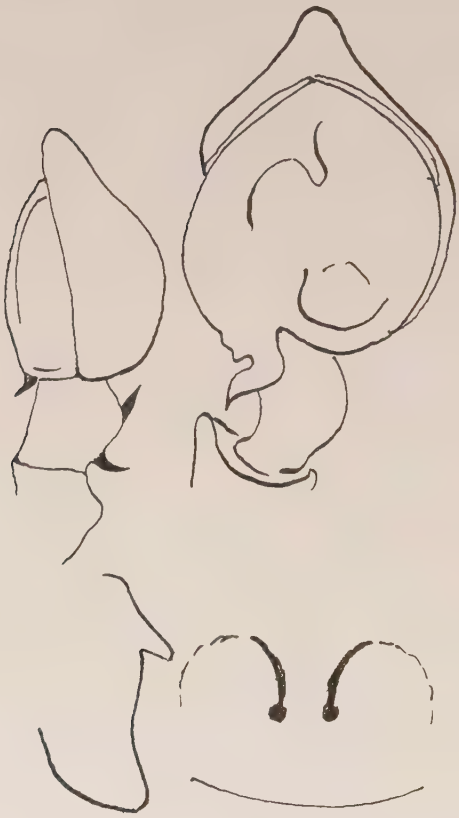

FIG. 17. *DICTYNA REMOTA* sp. nov.
Palpus from side and beneath; side view of mandible of male and epigynum.

Family DRASSIDAE.

Zelotes galapagoensis Banks?

An immature specimen from the beach of Indefatigable, April 19th, agrees with the description, but one cannot be certain without a mature specimen.

Family CLUBIONIDAE.

An immature specimen of a *Clubiona*, or allied genus, is from Tower, April 27th.

Family DICTYNIDAE.

Dictyna remota sp. nov.

(Fig. 17)

Cephalothorax yellow-brown, with white hairs; legs pale, unmarked; abdomen whitish to greyish, with brown basal median stripe and two lateral stripes behind; venter pale. Related to *D. parietalis* of Central America, with which I formerly identified it. It differs in several respects; the female shows no bands on the legs the epigynum shows two smaller dark spots, farther apart, and the dark lines from them run mostly forward. The male has the same shaped mandibles as in *D. parietalis*, with the spine near outer base; the palpi are similar, the patella has a swelling at inner tip, the tibia has a hook at base similar to that of *D. parietalis*, but the subapical process is very different, a slender pointed process, whereas *D. parietalis* has a broad plate.

Length, 1.6 to 2 mm.

Daphne, April 23rd.

Family THERIDIIDAE.

Lathrodectes apicalis Butler.

From South Seymour, April 20th.

Argyrodes jucundus Cambr.

From Albemarle, April 6th.

Family EPEIRIDAE.

Gasteracantha insulana Thorell.

From Albemarle, April 6th.

Argiope argentata Fabr.

From Indefatigable, April 8th, Duncan, April 25th, Tower, April 27th, Daphne, April 23rd, and South Seymour, April 20th.

Epeira oaxensis Keys.

From Indefatigable, April 4th and 8th, Duncan, April 25th, Tower, April 27th and 28th, James, April 4th, Eden and Tagus, April 6th, South Seymour, April 25th.

Epeira labyrinthea Htz.

From Daphne, April 23rd, and Tower, April 27th, 28th and 29th.

Epeira prompta Htz.

From Indefatigable April 4th, and South Seymour, April 20th.

Cyclosa conica Clerck.

From Daphne, April 23rd.

Nephila clavipes Linn.

From Eden, April 6th, common in tropical America.

Family SPARASSIDAE.

Heteropoda venatoria Linn.

One without locality.

Olios galapagoensis Banks.

From Indefatigable, April 8th, Eden, April 6th, and South Seymour, April 20th.

Family CTENIDAE.

Odo insularis Banks.

From Eden, under stones, April 6th.

FIG. 18. *PHANIAS DISTANS* sp. nov.
Palpus, tibia and metatarsus I, and fang and grooves of mandible.

Family ATTIDAE.

Plexippus paykulli Aud. et Sav.

Immature from South Seymour, April 20th.

Philaeus pacificus Banks.

From Tower, April 27th.

Metacyrba insularis Banks.

From Daphne, April 23rd.

Phanias distans sp. nov.

(Fig. 18).

Cephalothorax brown, eye area nearly black, mandibles reddish, legs yellowish brown, darker at bases and tips of many joints above; black haired, no fringes,

some short yellow hair on femur I. Abdomen yellow brown, with much black hair, no distinct markings, faint traces of median stripe in a few narrow chevrons; sternum and venter yellow brown with black hairs. Cephalothorax moderately flattened, not much broadened in middle. Abdomen slender, depressed. Each mandible with a bicuspid tooth on inner groove; sternum tapering in front and behind, the coxae I, however, separa e by nearly width of lip; legs slender, femora I and II more swollen, these with two long bristles above near base; tibia I wi h four spines on inner row, three on outer, tibia II with three in each row, metatarsi I and II with two in each row, tibia IV below with one at base and one near tip, metatarsi IV with one at basal third, and a pair at tip below; patellae III and IV unspined. Male palpus has a process from tibia, at first stout, then very slender and forked before tip, alongside of bulb is a rather stout style from base to beyond tip.

Length, 9 mm.

From South Seymour.

Evidently belongs to Simon's group of Maevia and Peckham's *Marptusa* group. Differs from *Marptusa* in more separated anterior coxae and rather fewer spines on legs, a though this is doubtless variable.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

THE FORMICIDAE OF THE HARRISON WILLIAMS GALAPAGOS EXPEDITION.

By William Morton Wheeler.

(Figures 19–27 incl.).

Four years ago I published an account of the Galapagos ants collected by the Expedition of the California Academy of Sciences in 1905 and 1906 and of those previously taken on some of the voyages of the "Albatross."[1] The fact that the description of these materials revealed almost nothing in regard to the habits of the insects and the prospect of finding additional species led me to accept the very generous invitation of Mr. Harrison Williams and Mr. William Beebe to join their expedition to the archipelago. Although the region that could be covered in the time at our disposal was limited, we were able to secure nineteen different forms, eight of which (two species and six varieties) are new to science and one (*Monomorium floricola*) a well-known tropicopolitan ant not hitherto recorded from the islands. The collection of so small a number of forms in any spot on the American mainland, except its arctic and antarctic ends, would have very little or no significance, but considering the meagerness of the Galapagos ant-fauna and the time and effort required in securing even a small number of specimens, those obtained and the observations made on their habits are well worth recording. Many other groups of insects, such as the butterflies, bees, wasps, termites, many families of Diptera, Coleoptera, etc., are even less abundantly represented in the Galapagos fauna. To the general statements on the Formicidae in the introduction to my paper of 1919 I have nothing to add.

Family FORMICIDAE.

Subfamily Ponerinae.

Cylindromyrmex williamsi sp. nov.

(Fig. 19, *b* and *c*).

Worker. Length 4.5–6 mm.

Closely related to *C. striatus* Mayr. Head longer than in that species, oblong, about one and a fourth times as long as broad, with nearly straight, parallel sides and feebly excavated posterior border. Eyes rather large, but

[1] The Ants of the Galapagos Islands, Proc. Calif. Acad. Sci. (4) 2, 1919, pp. 259–310.

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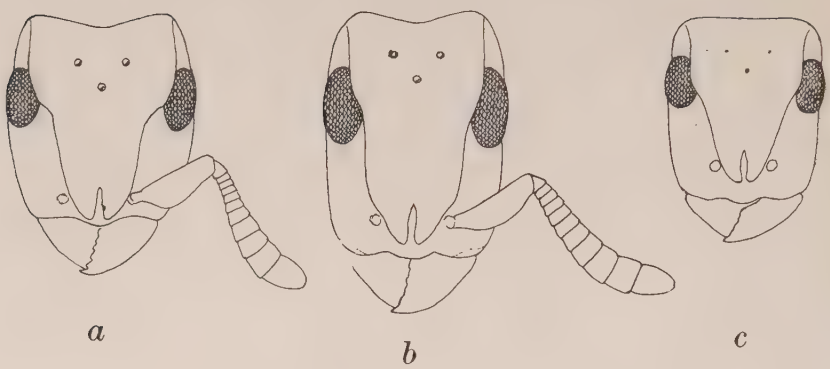

FIG. 19. CYLINDROMYRMEX STRIATUS MAYR; *C. WILLIAMSI* sp. nov. *a*, head of female *C. striatus*; *b*, head of female and *c*, head of worker *C. williamsi*.

not very convex, their anterior orbits at the median transverse diameter of the head. Small workers with distinct ocellar pits, large workers with a small anterior ocellus. Mandibles rather flat, with nearly straight external borders, the apical tooth large and blunt, the apical border somewhat undulating but not distinctly denticulate. Clypeus short, depressed, flat in the middle, more convex on the sides, which are produced and rounded anteriorly while the median border, though broadly rounded, recedes. Frontal area elongate elliptical, deeply impressed. Frontal carinae moderately prominent, extending back to the posterior orbits and thence continuous with rugae to the posterior corners of the head as in *striatus*. Antennal scapes reaching to the eyes, about four times as long as broad; funicular joints 2–6 much broader than long, 7–8 also transverse but proportionally longer, terminal joint about one and one-half times as long as broad. Thorax as in *striatus* but somewhat longer and more rectangular, about twice as long as broad; epinotal declivity sharply marginate laterally and above. Petiole in the smallest worker as broad as long, in larger individuals distinctly longer than broad; its anterior surface marginate on the sides and above, its anteroventral surface with a large, blunt, compressed tooth. Postpetiole from above trapezoidal, one and one-third times as long as its anterior border, the sides much less convex than in *striatus*. First gastric segment about one-fourth broader than the postpetiole; pygidium subtruncate, with a row of acute denticles on each side of its posterior half. Legs very distinctly more slender than in *striatus*, the anterior tibia fully three times as long as broad (in *striatus* scarcely two and one-half times). Middle and hind tibiae each with a single pectinated spur.

Shining; mandibles subopaque, sharply longitudinally striate. Middle of clypeus smooth, its sides, the scapes and the large antennal foveae finely longitudinally striate; cheeks and gular surface of head coarsely and somewhat irregularly, longitudinally striate; head above, thorax, petiole and postpetiole sculptured much as in *striatus*, with coarse longitudinal striae separated by rounded rugae, those on the thorax, petiole and postpetiole very regular, on the

head somewhat divergent posteriorly and dividing, thus increasing their number at the occipital border. There are also some coarse interrugal punctures in this region. The number of rugae on the vertex between the posterior continuations of the frontal carinae is about 15, there are about 10 on the thoracic dorsum and petiole and about twice that number on the postpetiole. Epinotal declivity and anterior surface of petiole shining and very finely shagreened. Gaster and legs very smooth and shining, with minute, scattered, piligerous punctures.

Hairs whitish, very sparse, conspicuous only on the clypeus, tip of gaster and venter; gaster with sparse, rather long pubescence; hairs on the tibiae very sparse, subappressed.

Black; tip of last funicular joint and terminal tarsal joints testaceous.

Female (deälated). Length nearly 7 mm.

Differing from the worker in having the head fully one and one-half times as long as broad. The eyes are larger and there are three rather small ocelli. Thorax somewhat depressed above, the pronotum with concave sides, broader behind than in front and broader than long, its lateral borders straight. Mesonotum and scutellum small, the former as broad as long, arcuately rounded in front. Epinotum with subequal base and declivity, the former of nearly the same shape and size as the pronotum. Sculpture and color similar to that of the worker but the striae on the sides of the thorax are finer. Hairs on the femora and tibiae much more numerous.

This species, which I dedicate to Mr. Harrison Williams, is described from two workers and a female taken near the south end of South Seymour Island, April 20th, 1923. In my paper of 1919 I erroneously identified this ant from specimens taken by Dr. F. X. Williams at Academy Bay, Indefatigable Island, as Mayr's *C. striatus*. On comparing one of the workers collected by Dr. Williams and the three specimens described above with a female of the true *striatus* (fig. 19 *a*) taken by Prof. C. T. Brues at Guayaquill, Ecuador and Cameron's figure of the worker, which he erroneously described as *Holcoponera whymperi*, I find that the Galapagos species is quite distinct. The legs of *striatus* are shorter, much more robust and of a different color, the head is shorter, the eyes smaller and less convex and the median portion of the clypeus longer and more produced, the antennal scapes are broader, the rugae on the head, thoracic dorsum, petiole and postpetiole are somewhat stronger and more even, the pubescence on the gaster is shorter and the hairs on the legs much less numerous. The striae on the mandibles, on the contrary, are more superficial and the mandibles, clypeus, cheeks and antennae are dark red.

The three specimens which I took on South Seymour Island, together with several young larvae, formed the entire personnel of a colony which was nesting in the dead branch of a Celastraceous shrub (*Maytenus obovata* Hook. *fil.*) growing near the beach. Many of the dead branches of the same shrub contained flourishing colonies of *Calotermes pacificus* Banks, but the ants did not actually live among them though evidently occupying galleries which they had once inhabited. This fact is of interest, because colonies of the allied genus Simopone of the Ethiopian and Malagasy regions have been taken in dead branches. Arnold records *S. marleyi* Arnold as occurring in hollow stems of the castor oil plant at Durban, Natal. That the ants of the two genera, Simopone of the Old, and Cylindromyrmex of the New World, which together

constitute Emery's Ponerine tribe Cylindromyrmicini, prey on termites and tend to establish their colonies near these insects is also indicated by Mayr's statement that Hetschko found *C. brasiliensis* in wood in the galleries of a termite at Santa Catharina, Brazil.

The larvae of *C. williamsi*, to which I have referred, were unfortunately lost through breaking of the vial in which they were contained so that I am unable to figure them. They were very long and slender, with narrow, curved neck and small head. The body was smooth, i. e., nontuberculate and covered with numerous, short, even hairs, as in Stigmatomma and allied Ponerine genera.

Among the specimens in my collection I find a winged female of a peculiar Bolivian Cylindromyrmex, of which I insert a description:

Cylindromyrmex (**Metacylindromyrmex**) **boliviae** sp. nov.

(Fig. 20).

Female. Length 10 mm.

Closely related to *C. godmani* Forel. Head subrectangular, fully one and one-half times as long as broad, as broad in front as behind but somewhat narrowed in the middle; its posterior border rather deeply and subangularly excised. Eyes moderately convex, but not as large as in the preceding species, their anterior orbits at the median transverse diameter of the head. Mandibles large, convex, with rounded external borders, a blunt apical tooth and broad, toothless apical border. Clypeus very short, abrupt in the middle, overarched by the very large and projecting frontal carinae, which extend back to the middle of the eyes. Frontal area elongate-elliptical, deeply impressed. Antennal scapes about two and one-half times as long as broad, abruptly narrowed at the base, with straight posterior and convex anterior border as in the preceding species; funicular joints 2–6 extremely short and transverse, the two penultimate joints nearly as long as broad. Thorax depressed above; pronotum transversely suboblong, only slightly broader behind than in front, its sides concave, its lateral borders subparallel and marginate; mesonotum as broad as long, its anterior border semicircular, its lateral borders concave; base of epinotum longer than the abrupt declivity which is concave in the middle and submarginate on the sides and above. Petiole subcylindrical, about one and one-fourth times as long as broad, concave on the sides, its anterior surface submarginate on the sides and above, its anteroventral surface with a large, blunt, compressed tooth. Postpetiole as long as broad, somewhat broader behind than in front, with straight sides, anterior and posterior borders, its ventral portion very convex and projecting in front. Pygidium slightly truncated behind, armed with a row of acute denticles on each side of its posterior half. Legs stout as in *C. striatus*, the fore tibiae somewhat less than two and one-half times as long as broad. Median and hind tibiae each with two well-developed pectinated spurs.

Shining; mandibles with fine, interrupted, superficial striae; anterior half of gula with coarse longitudinal striae, posterior half coarsely and sparsely punctate. Cheeks with a long, pronounced longitudinal stria or groove. Antennal foveae rather coarsely striate, remainder of head with longitudinal striae separated by rugae which on the front and occiput become coarser, more regular and very slightly divergent. Scapes very finely striolate. Pronotum with about

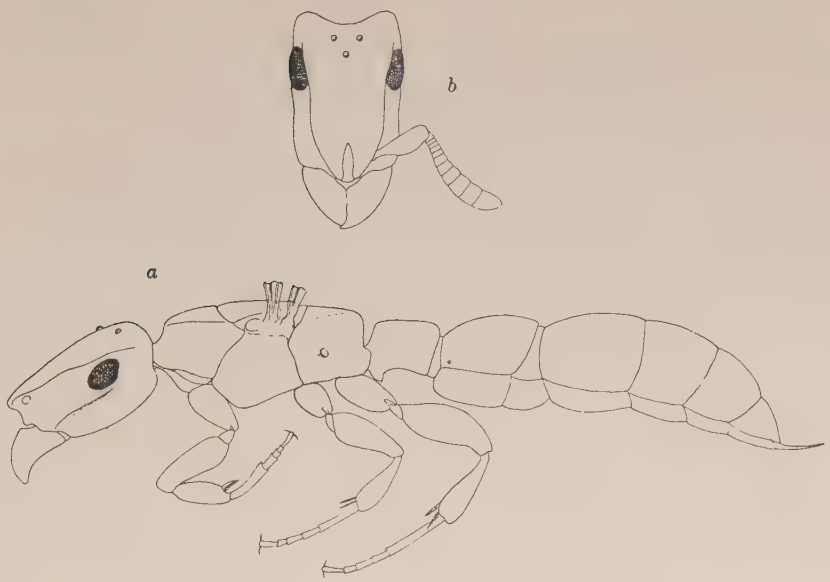

FIG. 20. *CYLINDROMYRMEX (METACYLINDROMYRMEX) BOLIVIAE* sp. nov. Female: *a*, profile, wings removed; *b*, head.

20 strong longitudinal rugae, separated by deep striae, mesonotum smooth behind, longitudinally striate in front, the striae diverging posteriorly. Scutellum smooth and shining, with a few punctures near its posterior border. Epinotum and petiole longitudinally striate, the striae rather irregular or branching. Sides of epinotum and lower mesosterna rather finely and sharply striate, upper mesosterna and sides of pronotum very smooth and shining. Postpetiole like the gaster, very smooth and shining, with small, scattered, piligerous punctures.

Hairs yellow, short, erect or suberect, more numerous than in *williamsi* on the head, thorax and petiole, on the gaster less numerous, longer and more erect. Tibiae and tarsi with long, uneven, suberect, somewhat bristly hairs.

Black; mandibles, funiculi, tips and bases of scapes, coxae and tip of gaster deep castaneous red; legs brownish yellow, knees and tips of tibiae darker. Wings distinctly infuscated, with dark brown veins and pterostigma.

A single specimen from Mapiri, Bolivia (Staudinger).

This species is very closely related to *C. godmani* of Panama and Ecuador, also known only from female specimens, but the latter species is larger (12.5 mm.), its antennal scapes and tibiae are shorter (scarcely twice as long as broad), the apical borders of the mandibles are bluntly denticulate, the petiole is shorter and has traces of striae, the femora are darker and the wings are described as brownish violaceous as in the bee *Xylocopa violacea.*

The workers and females of the seven known species of Cylindromyrmex may be separated by means of the following table:

1. Workers . . . . . 2.
   Females . . . . . 6.
2. Eyes very small and flat; anterior border of petiole emarginate in middle; first gastric segment striate . . . . . 3.
   Eyes large and convex, anterior border of petiole entire; first gastric segment smooth and shining . . . . . 4.
3. Head nearly twice as long as broad; apical borders of mandibles edendulate. Length 8 mm. (Brazil) . . . . . *longiceps* Ern. André.
   Head one and one-half times as long as broad; apical borders of mandibles bluntly denticulate. Length 5.5–6.5 mm. (Venezuela) . . . . . *meinerti* Forel.
4. Striae of head, thorax and pedicel coarse and regular; coxae trochanters and femora black or dark brown . . . . . 5.
   Striae of head, thorax and pedicel finer and less regular; legs yellow throughout. Length 6–7.3 mm. (Brazil, Paraguay) *brasiliensis* Emery.
5. Legs slender, entirely black, except the terminal tarsal joints. Length 4.5–6 mm. (Galapagos Islands) . . *williamsi* sp. nov.
   Legs stouter, tibiae except their ends, pale ivory yellow (Surinam, Peru, Ecuador) . . . . . *striatus* Mayr.
6. Frontal carinae moderately large; head not narrowed at the median transverse diameter; postpetiole coarsely longitudinally striate; middle and hind tibiae each with a single well-developed pectinated spur . . . . . 7.
   Frontal carinae larger and more projecting; head appreciably narrowed at the median transverse diameter; middle and hind tibiae each with two well-developed pectinated spurs . . 8.
7. Head one and one-half times as long as broad; legs black, except the terminal tarsal joints. Legs slender. Length 7 mm. . . . . *williamsi* sp. nov.
   Head shorter; legs stouter; tibiae, except their tips, pale ivory yellow. Length 7 mm. . . . . *striatus* Mayr.
8. Postpetiole nonstriate; fore tibiae more than twice as long as broad; femora yellow; wings brownish. Length 10 mm. (Bolivia) . . . . . *boliviae* sp. nov.
   Postpetiole somewhat striate; tibiae scarcely twice as long as broad; femora reddish black; wings brownish violaceous. Length 12.5 mm. (Panama, Ecuador) . . . . . *godmani* Forel.

The foregoing table shows that the species of Cylindromyrmex may be arranged in three distinct groups or subgenera, namely, *longiceps* and *meinerti*, which have very small, flat eyes in the worker and for which I suggest the name **Hypocylindromyrmex** subgen. nov., with *longiceps* as the type; *striatus*, *brasiliensis* and *williamsi*, which have large, rather convex eyes, moderate frontal carinae and only a single well-developed pectinated spur on the posterior tibiae (*Cylindromyrmex* sens. str., with *striatus* as the type), and *godmani* and *boliviae* with large, rather convex eyes, very large frontal carinae and two well-developed pectinated spurs on the posterior tibiae (**Metacylindromyrmex** subgen. nov., with *godmani* as the type). The brownish color and minute eyes of the

two species of Hypocylindromyrmex indicate that they do not inhabit twigs like the species of the two other subgenera but that they lead a hypogaeic life, probably in the abandoned galleries of terrestrial termites.

Ponera beebei sp. nov.

(Fig. 21).

Female (deälated). Length nearly 2 mm.

Head subrectangular, about one-sixth longer than broad, with distinctly concave posterior border, the sides behind the eyes straight and parallel, contracted somewhat in front of the eyes, which are small, rather flat and scarcely longer than their distance from the anterior corners of the clypeus. Ocelli small and widely separated. Mandibles moderately large, their broad apical

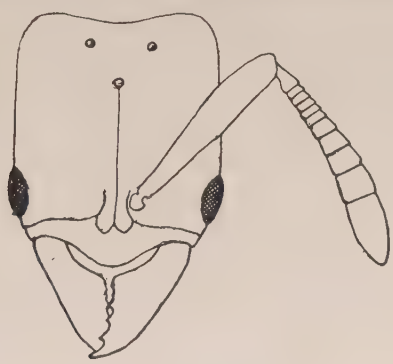

FIG. 21. *PONERA BEEBEI* sp. nov.
Head of female.

borders with four rather widely separated, acute teeth. Clypeus short, abrupt, strongly carinate, its anterior border advanced and rounded in the middle, sinuate on each side. Frontal carinae rounded, with ciliated borders; frontal groove distinct, extending to the anterior ocellus. Antennal scapes not reaching the posterior border of the head; funicular joints 2–6 subequal, very transverse, more than twice as broad as long; remaining joints forming a 5-jointed club, all the joints of which, except the last, are broader than long and gradually increase in length apically, the terminal joint somewhat shorter than the three preceding joints together. Thorax slightly more than twice as long as broad, as broad behind as in front, rounded anteriorly and posteriorly, its dorsal outline straight in profile, the mesonotum and scutellum small and flat, the former broader than long, with semicircular anterior border; epinotum with straight base and declivity, the latter longer than the former, its sides rounded, not marginate. Petiolar node thick, about one and one-half times as high as long, much narrower than the epinotum, truncated anteriorly and posteriorly and with a rounded summit, which is distinctly thinner than the base. Seen from behind the node is subcircular. The ventral surface in profile is feebly convex, not swollen, and without an anterior tooth. Postpetiole trapezoidal from above, broader than long, narrowed in front, with straight anterior and

lateral borders; strongly truncated in front. Constriction behind the postpetiole well-developed. First gastric segment distinctly broader than long, from above transversely rectangular. Legs rather slender.

Shining; mandibles smooth, with minute scattered piligerous punctures; remainder of body finely and distinctly but not very densely nor deeply punctulate; sides of thorax finely rugulose; antennal scapes and legs more finely and densely punctulate and less shining.

Hairs and pubescence white, abundant, the former short and uneven, most distinct on the clypeus, summit of petiole and tip of gaster, the pubescence long, subappressed, grading into the pilosity, conspicuous on the thorax, petiole and gaster, somewhat shorter on the head, especially on its dorsal surface. Antennae and legs with fine, dense, subappressed pubescence.

Dark brown, almost black, mandibles and legs brownish yellow, or testaceous; clypeus, antennae and a large round spot on the front brownish red.

A single specimen which I found under a large stone embedded in the sand of the small beach of Tower Island.

I have described this form as new because I am unable to refer it to any of the species known to me from specimens or descriptions. The antennae seem to be most like those of *P. gleadowi* Forel of India and Borneo, but the color, sculpture, shape of petiole, etc., are very different.

Subfamily MYRMICINAE.

Pheidole williamsi Wheeler var. **seymourensis** var. nov.

Soldier and Worker. Differing from the typical *williamsi* of Indefatigable Island in color, the body being yellowish brown, with the posterior portion of the head, the dorsal surface of the thorax and nodes darker, the gaster almost castaneous brown, and the middle portions of the femora slightly infuscated.

Two very small colonies of this variety were found, one in a nest in the sand just beyond the beach on South Seymour Island, the other under a large stone in the bottom of the crater of Daphne Island. *Ph. williamsi* seems to be closely related to the tropicopolitan *Ph. megacephala* Fabr., but is smaller, the soldier has a smaller, more rounded head, with longer antennal scapes and there are differences in the structure of the thorax and pedicel, the humeri being less prominent and more rounded and the postpetiole shorter and more transversely elliptical.

Monomorium floricola Jerdon.

Several colonies of this minute tropicopolitan ant, hitherto unrecorded from the Galapagos Islands, were found nesting in dead twigs of *Bursera graveolens* Trian. and Planch. in the thickets on Tower Island. The workers were assiduously visiting the nectaries of the flowers of *Cordia lutea* Lam. and of the large cactus, *Opuntia helleri*, which is peculiar to the island. This ant must have reached Tower Island in floating vegetation since the females are wingless.

Solenopsis globularia F. Smith subsp. *pacifica* Wheeler.

(Fig. 22).

Female (deälated), undescribed. Length nearly 4 mm.

Resembling the worker. Head proportionally shorter and more rectangular; eyes much larger. Thorax from above elongate elliptical, narrower than the

head, about two and one-half times as long as broad; epinotum in profile rounded and steeply sloping, without distinct base and declivity; petiole higher and more compressed anteroposteriorly than in the worker; postpetiole short, transverse, about two and one-half times as broad as long. Gaster large and elongate. Sculpture, pilosity and color as in the worker, but each of the gastric segments with a broad, poorly defined, brown transverse band.

Numerous workers and a single female from several colonies found at Seymour Bay, Indefatigable Island, Daphne Island and Tower Island. On Daphne

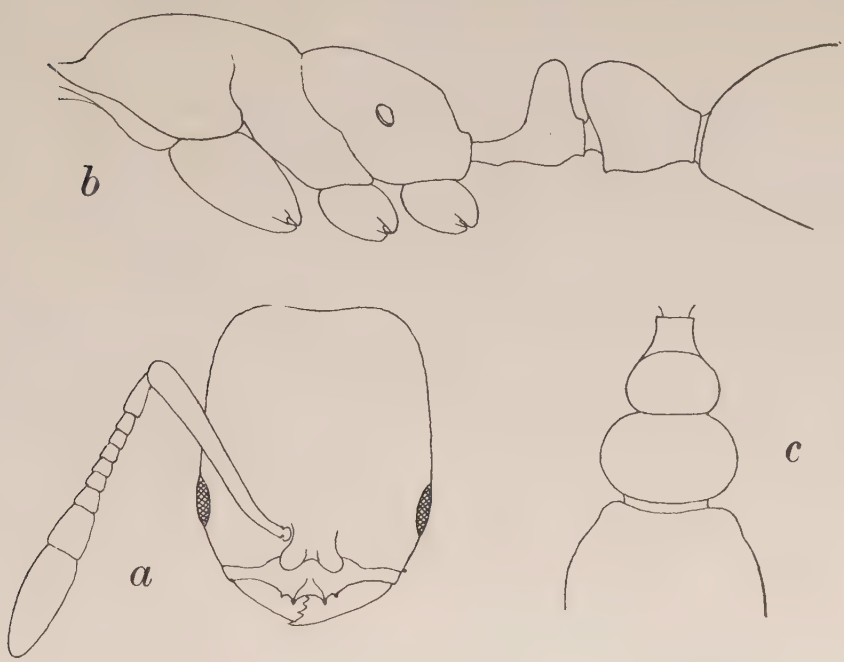

FIG. 22. *SOLENOPSIS GLOBULARIA* F. Smith subsp. *PACIFICA* Wheeler. *a*, head of worker; *b*, thorax and pedicel of same in profile; *c*, pedicel, dorsal view.

Island these ants were nesting under stones at the bottom of the crater, in the other localities under small logs lying on the sandy beach or among the thickets above high water mark. This subspecies was first taken on Albemarle and Tower Islands by F. X. Williams and the Albatross Expedition of 1899.

Tetramorium guineense Fabr.

In my previous paper I recorded this widely distributed tropicopolitan ant from South Albemarle (F. X. Williams). Emery mentioned it from Chatham Island (G. Baur) and the Albatross Expedition of 1899 secured it from the islands but failed to note the precise locality. I found it only on Tower Island, confined

to the small beach and nesting under stones and the bark of bushes. The workers were exploring the foliage of the bushes on which great numbers of frigate birds and gannets were nesting.

Subfamily DOLICHODERINAE.

Dorymyrmex (Conomyrma) pyramicus Roger subsp. *albemarlensis* Wheeler.

(Fig. 23).

This ant, previously known only from Albermarle Island, is common at Seymour Bay, Indefatigable Island and on South Seymour Island. It was

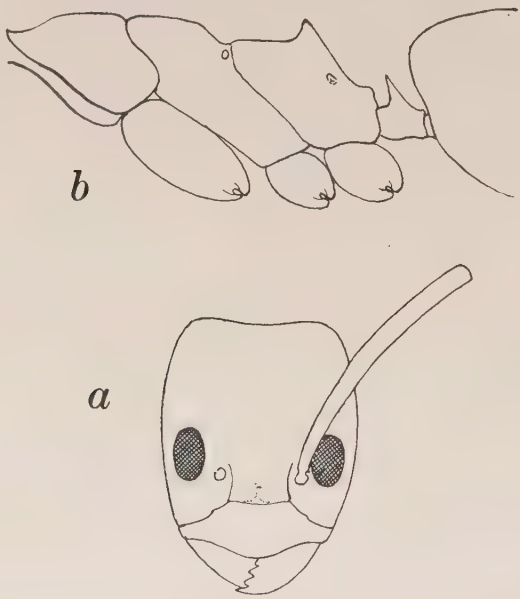

FIG. 23. *DORYMYRMEX (CONOMYRMA) PYRAMICUS* Roger subsp. *ALBEMARLENSIS* Wheeler.

a, head of worker; *b*, thorax and petiole of same in profile.

also taken by members of the expedition at Tagus Cove, Albermarle and on Eden Rock. It nests near sea-level in flat, crater nests in the sandy soil, or decomposed lava in the hot open spaces among the vegetation. The behavior of the very active and enterprising workers is like that of other forms of *pyramicus* which ranges from our Southern and Southwestern States to Argentina.

Tapinoma melanocephalum Fabr.

A widely distributed tropicopolitan ant, the "hormiga bottegaria" of the Latin Americans, previously taken on the east side of Indefatigable Island by Dr. F. X. Williams and on the boat at Chatham Island by Dr. G. Baur. I found several populous colonies on Tower Island, nesting in abandoned Calotermes galleries in dead branches of *Bursera graveolens*.

Subfamily FORMICINAE.

Prenolepis (Nylanderia) vividula Nyl. subsp. **guatemalensis** Forel var. **edenensis** var. nov.

Eight workers and a deälated female taken by members of the expedition from a single colony on Eden Rock agree closely with the var. *cocoënsis* Forel from Cocos Island, except in color, the gaster being dark brown, in the eyes of the worker which are smaller and more convex than in Forel's variety and the pubescence which, especially on the head and gaster, is distinctly longer, so that these regions are less shining.

Prenolepis (*Nylanderia*) *fulva* Mayr subsp. *nesiotis* Wheeler.

A number of workers taken from a single colony nesting in the sand above high water mark at Seymour Bay, Indefatigable Island agree closely with the cotypes of *nesiotis* from James Island in my collection, except in the coloration of the gaster, which is somewhat darker. The differences do not seem to be sufficient to justify the introduction of a new varietal name.

Genus *Camponotus* Mayr.

Perhaps no other group shows the poverty of the ant-fauna of the Galapagos so clearly as the genus Camponotus, which is represented by such an enormous number of forms in continental tropical America. Only three small species have been recorded from the archipelago: *senex*, *macilentus* and *planus*, all by Frederick Smith. He recorded the first as having been taken by W. E. Cookson, commander of the *Petrel* while on its voyage to the islands in 1875. As this species has since been taken only in Central and South America and as Smith was notoriously careless in making identifications even of species which he had himself described, I believe that we are justified in dropping it from the Galapagos faunal list. In British Guiana during the summer of 1920 and again in Panama during the summer of 1923 I had an opportunity to study *C. senex*. As Forel was the first to ascertain,[2] this ant, like Oecophylla and many species of Polyrhachis in the Old World and *C. formiciformis* Forel in Central America[3] makes a peculiar nest by using its larvae for spinning leaves together with layers of silk in the form of a ball. The nest may vary from the size of an orange to that of a football and is firmly attached to the twigs of a tree, sometimes at a considerable distance from the ground. Several nests may occur on a

[2] Biol. Centr. Amer. Formicidae, 1899–1900, p. 139, pl. 2, fig. 5.

[3] According to observations recorded in my paper "On the Presence and Absence of Cocoons among Ants, the Nest Spinning Habits of the Larvae, etc. Ann. Ent. Soc. Amer. 8, 1915, p. 323–342, fig. 1.

single tree and may, perhaps, belong to a single polycladic colony. So far as I have been able to observe, *senex* lives only in the low jungle and almost always on trees or bushes growing along water-courses. This is certainly not an environment to be encountered in the Galapagos Islands.

There remain therefore only two species of Camponotus, *macilentus* and *planus*, as occurring on the archipelago. They have been taken on nearly all the larger and on several of the smaller islands and are, in fact, the most abundant and therefore the dominant components of the ant-fauna in the low xerothermal zone, the only part of the islands which has been carefully investigated. Both are very timid species which rarely attempt to bite even when their nests are violently disturbed. Although they coexist in the same localities, their habits are so different that they do not encroach on each other's activities. The pale yellow *C. macilentus* is a nocturnal ant, which lives in rather small colonies in dead branches of trees and shrubs (*Bursera graveolens* and *Maytenus obovata*) that have been hollowed out by Calotermes and wood-boring beetles. The workers and soldiers were never seen abroad in the day-time. At the time of my visit to the islands in the latter part of April, the nests contained considerable brood and many males and winged females. These phases were also taken in August by Dr. F. X. Williams, so that there must be either two brief periods or, more probably, a single protracted period during which the sexual forms are produced. The black *C. planus*, on the other hand, is a strictly diurnal ant which forms much more populous communities and nests in the soil about the roots of trees, shrubs, the large arborescent Opuntias or in old logs. The entrances are small and concealed so that the nests are found only by accident or by following foraging workers. The latter are most frequently seen on the foliage of the thickets in search of insect prey or visiting the flowers for their nectar. The beautiful clustered yellow flowers of *Cordia lutea* attract them as well as many other insects, *Xylocopa*, *Chrysopa*, beetles, etc., in considerable numbers. On Indefatigable and South Seymour I failed to find any males or winged females in the nests during late April, but these phases were secured by members of the expedition April 1 to 7 on Chatham, Albemarle, James and at Conway Bay, Indefatigable Island. Dr. Williams collected males and winged females on Duncan, Charles and Indefatigable during August, October and November. It would seem, therefore, that

this species either sends off its sexual phases at very different times of the year on different islands or that they are developed continuously over a long period from August to the beginning of April.

I maintained in my former paper that both *macilentus* and *planus* have produced a number of varieties, one or more of which occur on each of the islands of the archipelago. The materials collected by the Harrison Williams expedition confirm this statement and fill some of the gaps in the previously known distribution of the species. No forms of *macilentus* were previously recorded from Indefatigable, but the expedition took a new dark variety and a paler undescribed form on that island and South Seymour. A hitherto unnamed variety was also secured on Tower Island. Previous expeditions took no forms of *planus* on James, but members of our party captured specimens of a new variety on that island and also the hitherto unknown male and female of the var. *peregrinus* Emery on Chatham. The two species of Camponotus are so variable and the differences between their varieties often so feeble and illusive that much more material will have to be studied before a satisfactory conspectus of their characteristics and distribution can be given. Future collectors in the islands should therefore make a strenuous effort to obtain as many specimens as possible of these ants.

In my former paper I placed *C. macilentus* in the subgenus Myrmamblys but Emery has recently removed it to his subgenus Pseudocolobopsis[4] and I have followed him in this paper. He agrees with me in placing *planus* in the subgenus Myrmorhachis Forel, but I have recently given the American species of this group the name Myrmocladoecus[5] and this name will have to be substituted for Myrmorhachis (Emery 1920). But all the known neotropical species of Myrmocladoecus (*bidens* Mayr, *bispinosus* Mayr, *latangulus* Rog., *mucronatus* Emery, *quadrilaterus* Mayr, etc.) nest in plant cavities, whereas *planus* nests in the ground. The structure of the head and thorax, the pilosity and sculpture would justify one in placing it in Orthonotomyrmex Ahsmead, were it not that this subgenus is now restricted to Old World species. The precise position of *planus* must therefore be left to be determined by the future student who can make a detailed study of the various sub-

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[4] Le Genre "Camponotus" Mayr, Nouvel Essai de la Subdivision en Sousgenres. Rev. Zool. Afr. 8, 1920, p. 229–260.

[5] Professor Emery's Subgenera of the Genus Camponotus Mayr. Psyche 28, 1921, p. 19.

genera of Camponotus and of their limits. For the present I retain the species from the Galapagos in the subgenus Myrmocladoecus.

Camponotus (Pseudocolobopsis) macilentus F. Smith var. **sapphirinus** var. nov.

(Fig. 24).

Worker major. Length 6-7 mm.

Head about one-fifth longer than broad, distinctly broader behind than in front, with nearly straight sides and posterior border; anterior borders of cheeks not very convex nor projecting. Clypeus subrectangular, scarcely broader in front than behind, somewhat longer than broad, its posterior half distinctly

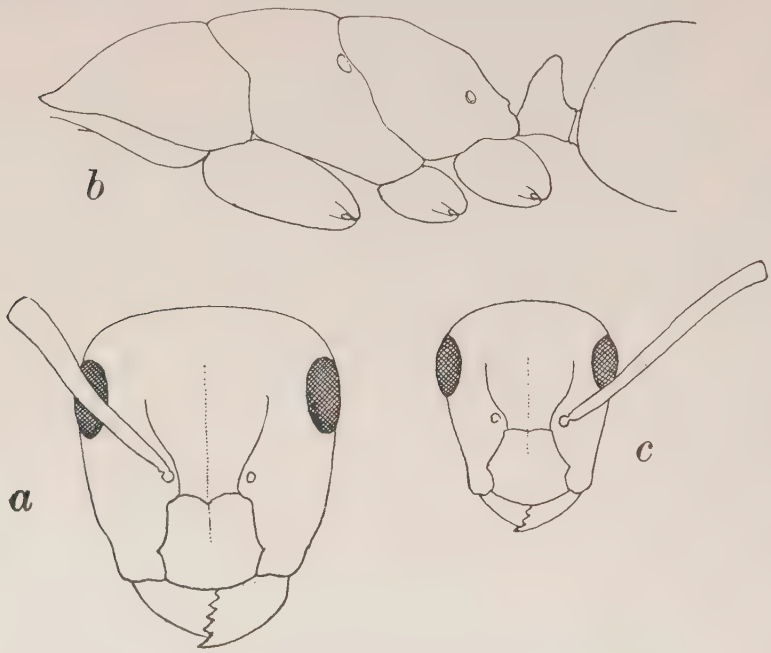

FIG. 24. *CAMPONOTUS (PSEUDOCOLOBOPSIS) MACILENTUS* F. Smith var. *SAPPHIRINUS* var. nov.

a, head of worker major; *b*, thorax and petiole of same in profile; *c*, head of worker minor.

carinate in the middle, its anterior border very feebly and broadly rounded, rather receding. Scapes reaching nearly twice the width of their tips beyond the posterior corners of the head. Thorax strongly compressed behind, the epinotum in profile not evenly rounded but made up of three subequal planes meeting at rounded obtuse angles. Petiolar node low and thick, its upper border blunt, entire and when seen from behind broadly rounded.

Shining; mandibles and anterior portion of head less so than the remainder of the body, which is very finely shagreened.

Pilosity much as in the other varieties, the color considerably darker. Body

brownish yellow; mandibles and anterior border of head brownish red; antennae, a large spot on the front and vertex, the whole meso- and epinotum, the tibiae, tarsi and a broad transverse band on each gastric segment, brown; the cephalic spot, apical half of the scapes and gastric bands darker, more castaneous brown. Owing to its fine transverse shagreening the upper surface of the gaster in direct sunlight has a pronounced blue iridescence, which is absent or very faint in the other varieties. The top of the head and sides of the thorax display a similar but feebler iridescence.

Worker minor. Length 4.5–5.5 mm.

Closely resembling the major worker, except in the shape of the head, which in the minima is nearly one and one-third times as long as broad, with more rounded posterior corners. straight, anteriorly somewhat converging cheeks and broader and less distinctly carinate clypeus, The scapes extend about one-third their length beyond the posterior corners of the head. Color similar to that of the worker major, but there are differences in the head, which is whitish or ivory yellow in front and diffusely brownish behind; the mandibles are brownish yellow, the antennae, especially the apical halves of their scapes, paler than in the major. The pronotum may be somewhat brownish posteriorly, but this is also the case in some of the larger workers.

Female (deälated). Length 7–8 mm.

Like the major worker, but with larger eyes, shorter clypeus and the anterior portion of the head more sharply sculptured. Petiolar node very thick and broad, its superior border entire, very blunt, straight and transverse. The pilosity and color are also similar but in some specimens the dark brown area on the front and vertex is more extensive and less sharply defined, in others restricted to the ocellar triangle. Each ocellus has a black spot at its inner border. Mesonotum with a large rectangular brown spot on the middle of its posterior three-fourths in some specimens, in others there is merely a brownish cloud.

Male. Length 5–5.5 mm.

Pale ivory yellow, head and gaster brownish, the latter with the posterior borders of the segments yellow; the former with the ocellar triangle dark brown, almost blackish, and each ocellus with a black spot at its inner border; the front pale brown but somewhat variable in different specimens. Wings pale yellowish hyaline, the pterostigma scarcely darker than the veins, which are pale yellow. There is a small black spot at the base of each of the anterior wings.

Described from numerous specimens nesting in hollow twigs of *Maytenus obovata*, previously inhabited by *Calotermes pacificus* colonies, near sea-level at Seymour Bay, Indefatigable Island and on South Seymour Island.

This variety of *macilentus* differs markedly from all those previously described in the deeper and more extensive infuscation of the head, thorax and gaster and the distinct iridescence of the gaster in the worker and female.

Camponotus (**Pseudocolobopsis**) **macilentus** var. **pervicus** var. nov.

Worker major. Length 4.5–5 mm.

Very similar to the preceding variety but smaller, more thickset, with proportionally larger head and paler, posteriorly less compressed thorax. Thorax and petiole immaculate, the head with a pale brown, sometimes very faint, spot on the vertex. Bands on the gaster much narrower, each produced anter-

iorly as a point in the middle line. Apical half of scapes in some specimens with a black streak on its anterior and posterior border. The ground color of the body, especially of the thorax, petiole and gaster is paler than in the var. *sapphirinus* and there is scarcely a trace of iridescence.

Worker minor. Length 4 mm.

Very similar to the major worker in color; the head as in the var. *sapphirinus* but the body smaller.

Female. Length 6–6.5 mm.

Smaller than *sapphirinus* and colored like the major worker, but with a faint brownish cloud on the vertex and posterior portion of the mesonotum. Each ocellus has the usual black spot at its inner border. Wings 6.5 mm. long, distinctly brownish yellow, with brownish yellow veins and pterostigma.

Male. Length 4.5 mm.

Also smaller than the corresponding sex of *sapphirinus*, but the gaster is as pale as the head and thorax and the suture between the mesonotum and scutellum is black. The vertex is brownish, the ocelli as usual with a black spot at their inner borders.

Several specimens from a single small colony taken in a *Maytenus obovata* twig at Seymour Bay, Indefatigable Island.

The small dimensions of all four phases show that we are dealing with a distinct variety or subspecies of *macilentus*.

Camponotus (*Pseudocolobopsis*) *macilentus* var. *jacobensis* Wheeler.

Single winged female and male specimens taken by members of the expedition on James Island April 5th, though somewhat darker, agree well with my topotypes collected by Dr. F. X. Williams.

Camponotus (**Pseudocolobopsis**) **macilentus** var. **castellanus** var. nov.

(Fig. 25).

Worker major. Length 6–7 mm.

Head fully one and one-fourth times as long as broad, subrectangular, scarcely narrowed in front except at the extreme anterior end of the cheeks, the posterior border and sides straight. Cheeks in front convex and projecting on either side of the clypeus, which is subelliptical and notched behind at the indistinct frontal area. Scapes extending beyond the posterior corners of the head a distance equal to the width of their tips. Posterior portion of thorax moderately compressed, the base of the epinotum in profile convex and rounded, decidedly longer than the abrupt, concave declivity. Petiolar node smaller and thinner than in the other varieties, its superior border rather sharp, transverse and feebly concave in the middle.

Sculpture of the mandibles, anterior and dorsal surface of the head rather sharp so that these regions are distinctly less shining than the remainder of the body.

Brownish yellow; coxae and femora paler, thorax and petiole immaculate; mandibles, anterior border of clypeus and cheeks, apical half of scapes, a large spot on the front and vertex, tibiae and tarsi reddish brown. Gaster dark brown, with the posterior border and two transverse spots at the base of each segment, brownish yellow.

Worker minor. Length 4–5.5 mm.

Head very similar to that of the major worker, but with sides feebly rounded, scarcely narrower in front than behind, clypeus shorter, distinctly carinate. Antennal scapes extending about one-third their length beyond the posterior border of the head. Color similar to that of the major but mesonotum, epinotum and petiole brownish. Tibiae only slightly darker than the femora, which

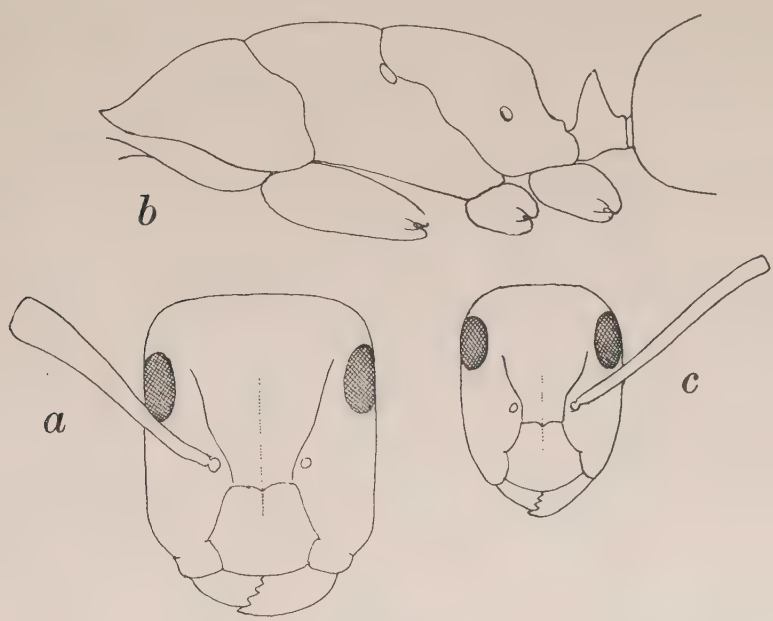

FIG. 25. *CAMPONOTUS (PSEUDOCOLOBOPSIS) MACILENTUS* F. Smith var. *CASTELLANUS* var. nov.

a, head of worker major; *b*, thorax and petiole of same in profile; *c*, head of worker minor.

like the coxae, anterior portion of the head and paler portions of the gaster, are whitish or ivory yellow; knees brownish. The epinotum and petiolar node have the same shape as in the major worker.

Female. Length 7–7.5 mm.

Head large, like that of the major worker, not narrowed in front, but the scapes extend about twice their greatest diameter beyond the posterior corners. Color as in the worker major but the scutellum and a large rectangular spot on the posterior portion of the mesonotum are brown. Wings nearly 8 mm. long, distinctly brownish yellow, with pale brownish pterostigma and pale yellow veins.

Male. Length 5.5–6 mm.

Brownish yellow, the gaster a shade darker, the mandibles, anterior portion of head, pleurae, coxae and femora paler; a small black spot at the base of each fore wing and the usual black spot at the inner border of each ocellus

very distinct. Ocellar triangle more or less brownish. Wings paler than in the female, the pterostigma not darker than the veins, which are pale yellow.

Described from numerous specimens taken from dead twigs and branches of *Bursera graveolens*, abandoned by colonies of *Calotermes pacificus*, on Tower Island. In my paper of 1919 (p. 287) I recorded a major and two minor workers of this variety, among the material taken in 1899 by the "Albatross" on the same island, but the specimens were so greasy and defective that I did not give them a name.

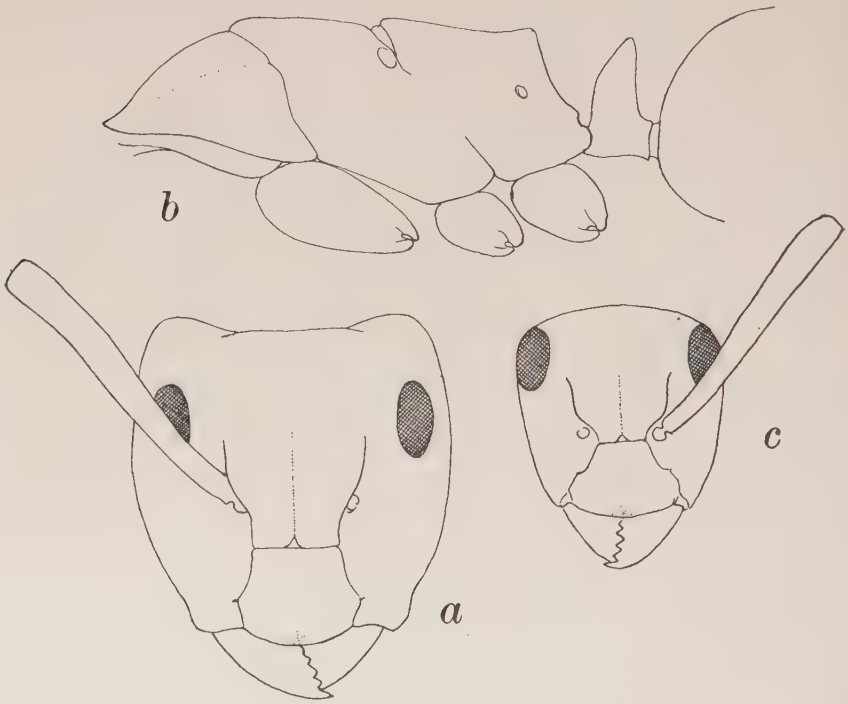

FIG. 26. *CAMPONOTUS* (*MYRMOCLADOECUS*) *PLANUS* F. Smith var. *SANTA-CRUZANUS* Wheeler.

a, head of worker major; *b*, thorax and petiole of same in profile; *c*, head of worker minor.

This variety is distinct in the shape of the head in the worker and female and in that of the petiolar node of the worker. In these phases there is a faint trace of iridescence on the gaster when it is viewed in direct sunlight. The same is also true of the var. *jacobensis*.

Camponotus (*Myrmocladoecus*) *planus* F. Smith var. *peregrinus* Emery.

Female (undescribed). Length 7.5 mm.

Compared with the typical *planus* of Charles Island, the differences are mainly in color and pubescence. The body is black, the red areas of *planus*

being more restricted and the red shade of the appendages deeper. On the gaster the appressed pubescence is distinctly shorter, less dense and less silky, so that this region has a different, faintly grayish luster. The pterostigma of the wings is pale yellow, like the veins.

Male (undescribed). Length 5.5 mm.

Also darker than the male of the typical *planus*, the body being jet black; the mandibles, funiculi and trochanters reddish, and the legs and antennal scapes black, slightly tinged with red. Pterostigma and veins of wings pale brown.

Single specimens taken by members of the expedition on Chatham Island, April 7th, 1923.

Camponotus (*Myrmocladoecus*) *planus* var. *isabelensis* Wheeler.

I refer two males taken April 6th, at Tagus Cove, Albemarle Island to this variety.

Camponotus (*Myrmocladoecus*) *planus* F. Smith? var. *santacruzensis* Wheeler.

(Fig. 26).

Specimens from several large colonies were collected at Seymour Bay, Indefatigable Island and on South Seymour Island during the latter part of April. They were nesting in the ground about the roots of trees and shrubs and the large arborescent Opuntias peculiar to the islands. The largest workers attain a length of 7 mm. which is a millimeter more than I recorded for the specimens collected by Dr. Williams. The body has little pilosity and the head is entirely black, not red anteriorly as in the following variety:

Camponotus (*Myrmocladoecus*) *planus* var. *indefessus* Wheeler.

A number of small workers and males were taken by members of the expedition April 1st, 1923 at Conway Bay, Indefatigable Island.

Camponotus (**Myrmocladoecus**) **planus** F. Smith? var. **sansalvadorensis** var. nov.

(Fig. 27).

Worker minor. Length 4.5–5.5 mm.

Head trapezoidal, slightly longer than broad, with straight anteriorly converging sides, the eyes at the posterior corners and apparently somewhat more projecting and convex than in the other varieties. Antennal scapes slender and terete at the base, even in the media (in other forms of the species broader and at least slightly flattened), extending somewhat less than half their length beyond the posterior border of the head. Thorax with the base of the epinotum distinctly concave in profile, its posterior angles somewhat dentate, much as in the var. *indefessus*. Pilosity as abundant as in that form but slightly shorter and paler. The appressed pubescence on the gaster is distinctly paler and sparser so that it has only a faint, silvery luster. Body subopaque and of the usual sculpture and color, only the mandibles, anterior edges of the cheeks and the appendages being red.

Male. Length 4–5.3 mm.

Indistinguishable from the male of the var. *peregrinus* Emery.

Six workers and five males, taken April 5th, 1923, on James Island by some of the members of the expedition.

The distinguishing character of this variety seems to be the terete, or cylindrical base of the antennal scapes, which are broader and distinctly more or less flattened in the other forms of the species. Probably the unknown worker major has flattened but very narrow scapes.

The known distribution of the various forms of *C. macilentus* and *planus* is given in the following table, which is merely an amplification of the one published in my paper of 1919. It will be seen that while some form of *macilentus* is known to occur on each of the islands on the list except Chatham, *planus* is unknown from Hood, Bindloe and Tower. I feel confident that it really does not exist on the outlying Tower and that the same statement is probably true of Bindloe, but Hood, judging from its geographical position, should yield a distinct variety. The occurrence of a peculiar variety of *macilentus* may also be predicted for Chatham.

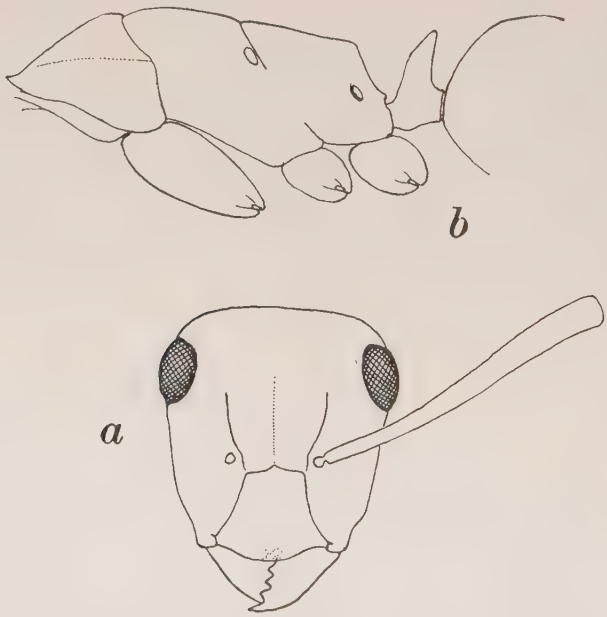

FIG. 27. *CAMPONOTUS* (*MYRMOCLADOECUS*) *PLANUS* F. Smith var. *SANSALVADORENSIS* var. nov.

a, head of worker media; *b*, thorax and petiole of same in profile.

	ISLANDS	
Macilentus, typical	Charles	*planus*, typical
(? an undescribed variety)	Chatham	var. *peregrinus*
var. *narboroënsis*	Narborough	var. *fernandinensis*
var. *albemarlensis* / var. *vulcanalis*	Albemarle	var. *isabelensis*
var. *duncanensis*	Duncan	var. *pinzonensis*
var. *pervicus* / var. *sapphirinus*	Indefatigable	var. *indefessus*
	South Seymour	var. *santacruzensis*

var. *hoodensis* . . . . . Hood . . . . . (? an undescribed variety)
var. *barringtonensis* . . . . . Barrington . . var. *fidelis*
var. *jacobensis* . . . . . James . . . . . var. *sansalvadorensis*
var. *bindloënsis* . . . . . Bindloe . . . . . (? absent)
var. *castellanus* . . . . . Tower . . . . . (absent)

In conclusion I append a complete list of the Galapagos Formicidae with their distribution, so far as it has been ascertained from the materials collected by the Harrison Williams and previous expeditions. For reasons given above I have omitted *Camponotus senex* and have substituted *Cylindromyrmex williamsi* for *C. striatus*. As revised the list shows that forty-two different forms have so far been taken in the islands, that there are only five species, but twenty-eight varieties or subspecies, peculiar to their fauna and that some nine species are common tropicopolitan vagrants, or tramps. The list also shows that nearly twice as many ants (12) are recorded from Indefatigable as from any of the other islands. This merely means, of course, that more numerous collections have been made in that one locality.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

Names of Species, Subspecies and Varieties	Narborough	Albemarle	Duncan	Charles	Hood	Chatham	Barrington	Indefatigable	Eden Rock	South Seymour	Daphne	James	Tower	Bindloe	Abingdon
Cylindromyrmex williamsi	—	—	—	—	—	—	—	×	—	×	—	—	—	—	—
Ponera beebei	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—
Odontomachus haematoda subsp bauri.	—	—	—	×	—	×	—	—	—	—	—	—	—	—	—
Pheidole williamsi	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—
var. seymourensis	—	—	—	—	—	—	—	—	—	×	×	—	—	—	—
Pheidole sp.	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—
Solenopsis saevissima	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—
Solenopsis geminata	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—
Solenopsis globularia var. galapagaea	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
var. pacifica	—	×	—	—	—	—	—	×	—	—	×	—	×	—	—
var. rubida	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
Monomorium pharaonis	—	—	—	—	—	—	—	×	—	—	—	—	—	—	×
Monomorium floricola	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—
Tetramorium guineënse	—	×	—	—	—	×	—	—	—	—	—	—	×	—	—
Tetramorium simillimum	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
Dorymyrmex pyramicus subsp. albemarlensis	—	×	—	—	—	—	—	×	×	×	—	—	—	—	—
Tapinoma melanocephalum	—	—	—	—	×	×	—	×	—	—	—	—	×	—	—
Prenolepis longicornis	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
Prenolepis vividula var itinerans	—	—	—	—	—	×	—	×	—	—	—	—	—	—	—
var. edenensis	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
Prenolepis fulva subsp. nesiotis	—	—	—	—	—	—	—	×	—	—	—	×	—	—	—
Camponotus macilentus	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
var. jacobensis	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—
var. albemarlensis	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—
var. vulcanalis	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—
var. duncanensis	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—
var. narboroënsis	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
var. hoodensis	—	—	—	—	×	—	—	—	—	—	—	—	—	—	—
var. barringtonensis	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—
var. bindloënsis	—	—	—	—	—	—	—	—	—	—	—	—	—	×	—
var. sapphirinus	—	—	—	—	—	—	—	×	—	×	—	—	—	—	—
var. pervicus	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—
var. castellanus	—	—	—	—	—	—	—	—	—	—	—	—	×	—	—
Camponotus planus	—	—	—	×	—	—	—	—	—	—	—	—	—	—	—
var. peregrinus	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—
var. isabelensis	—	×	—	—	—	—	—	—	—	—	—	—	—	—	—
var. indefessus	—	—	—	—	—	—	—	×	—	—	—	—	—	—	—
var. santacruzensis	—	—	—	—	—	—	—	×	—	×	—	—	—	—	—
var. fidelis	—	—	—	—	—	—	×	—	—	—	—	—	—	—	—
var. fernandinensis	×	—	—	—	—	—	—	—	—	—	—	—	—	—	—
var. pinzonensis	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—
var. sansalvadorensis	—	—	—	—	—	—	—	—	—	—	—	×	—	—	—
Number of forms on each island	2	7	2	6	3	6	2	13	2	5	2	3	6	1	1

Zoologica, Vol. V, No. 11.

TRIUNGULIN LARVAE FROM THE WILLIAMS GALAPAGOS EXPEDITION

TRIUNGULINS OF A MELOID BEETLE BORNE BY XYLOCOPA, WITH REMARKS ON THIS TYPE OF LARVA IN THE COLEOPTERA AND STREPSIPTERA.[1]

By Charles T. Brues.

(Figures 28–32 incl.).

Among the numerous specimens of the bee *Xylocopa transitoria* Pérez collected by the members of the Williams Expedition to the Galapagos, there is one female from South Seymour Island, taken by William Beebe, which is of particular interest. This specimen bears attached to the posterior part of the thorax a large number of Coleopterous triungulins which undoubtedly belong to some beetle parasitic upon this large bee.

The Xylocopa in question was preserved in a vial of alcohol and after its long voyage to New York and subsequent shipment to Boston still retains most of the triungulins attached to its body (Fig. 28). These now number approximately 100, in addition to some twenty-five which have become detached during transit. With the exception of two on the basal concavity of the abdomen, all are confined to the scutellum and to one side of the posterior declivity of the propodeum where they form a dense yellow mass. Each triungulin rests with the posterior end of its body directed away from the body of the bee. Examination of the individual triungulins shows that they maintain this position by closing the mandibles about a single body-hair of the bee, or by grasping several together in such a way that the branched hairs pass through the space between the closed mandibles and are pressed between these and the interior surface of the head, while the apical portion of the hair passes backward along the ventral surface of the body. Thus attached, the triungulin is further securely anchored by a peculiar modification of the mandibles which are not toothed along the inner

[1] Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 231.

First form on press February 27, 1924

FIG. 28. *XYLOCOPA TRANSITORIA* Pérez
Attached to the thorax is a group of triungulins of *Horia maculata* Swed.

FIG. 29. Mandibles of a triungulin of *HORIA MACULATA* Swed.
In microphotograph –A– the lens has been focussed at a higher level than in –B– to show the narrow spaces between the teeth at their bases.

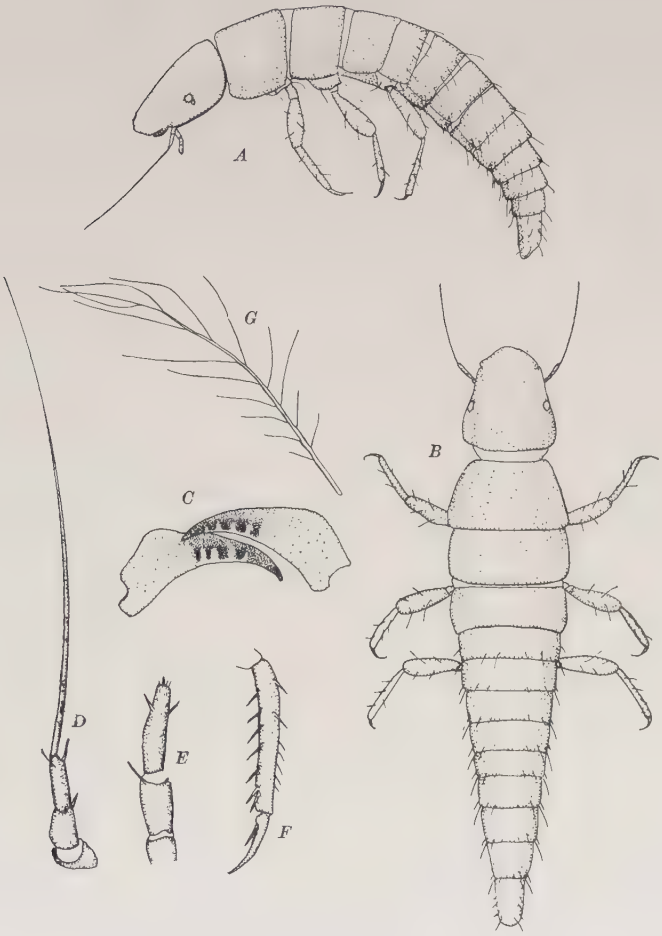

FIG. 30. Triungulin of *HORIA MACULATA* Swed.

A, lateral view; B, dorsal view; C, mandibles; D, antenna; E, palpus; F, tibia and tarsus of hind leg; G, body-hair taken from propodeum of *Xylocopa transitoria* Pérez.

cutting edge as is usual among insects. They are instead provided each with a series of tubercular projections or teeth on the upper surface, that is to say on the side which faces the under surface of the head. Thus when the mandibles are closed (Fig. 30, C; Fig. 29) the projections form a transverse line, each extending backward and serving to catch the hair (Fig. 30, G) so firmly in the notches between them that the triungulin is able to retain its hold continuously in spite of the active movements of its conveyer.

As will appear later, these triungulins are undoubtedly larvae of a species of Horia, most probably *H. maculata* Swed. They may be described as follows:

Length 1.3–1.7 mm. Uniformly pale brownish yellow, the eyes intensely black. Head much flattened; thorax less so, and abdomen nearly cylindrical in cross section. Head gradually narrowed anteriorly, the front border acutely rounded. Eyes set just back of the middle, small, oval, appearing in specimens that have been cleared in potash as composed of two ommatidia, a larger dorsal and a smaller ventral one. Antennae three jointed, very small; basal joint short, second and third cylindrical, the third more slender and slightly the longer; apical seta long and so extremely thin apically that its tip is difficult to see even with an oil-immersion lens; fully as long as the head. Palpi longer than the antennae; basal joint short; second and third longer; tip of third joint truncate and bearing a few very minute setae. Mandibles large, concealed beneath the head when closed; acutely pointed at tip; upper edge (*i. e.*, the surface next to the lower surface of the head) bearing four tooth-like ridges that extend backward. Thoracic segments longer than the abdominal ones; prothorax the longest and the metathorax shortest; all three entirely destitute of bristles. Abdomen long and tapering, composed of nine segments in addition to an apical membranous process (so-called anal sucker; not shown in the figure) which is sometimes extruded to nearly the length of the last segment; all the segments bear along the sides and posterior edge a number of bristly hairs. Legs moderately long, all three pairs of about the same size and form; femora somewhat thickened; tibiae more slender; tarsus (fig. 30, F) reduced to a single curved claw on each leg. The femora and tibiae are sparsely clothed with bristly hairs and each coxa bears one or two bristles.

Having noted the remarkable structure of the mandibles in this species, I was led to examine other triungulins for similar modifications and find that such exist in at least one other form. A female Andrena collected by Prof. W. M. Wheeler at Colebrook, Connecticut, bears attached to the body-hairs, several triungulins quite similar to those on the Xylocopa from the Galapagos, although differing in a number of characters. This larva is probably a Meloid of the tribe Zonitini represented in this region by at least one species, *Zonitis bilineata* Say. According to the studies of Cros ('13; '20) the larvae of this group and of the tribe Sitarini are distinguishable from the triungulins of other Meloidae and of the Rhipiphoridae by the presence of a pair of dorsal projections arising in the membrane between the eighth and ninth abdominal segments, formerly thought to be suckers or attachment organs, but shown by Cros to be respiratory organs. These are present in this triungulin, which further has bi-ocellate eyes and tarsal claws with a long basal bristle. The mandibles are strikingly similar to those of the Horia larvae from

the Galapagos, but are less highly modified. The teeth are on the upper surface of the mandible, but are closer to the edge and actually project over the edge in optical section. This type of dentition is therefore intermediate between that with the usual dentate inner edge and the modification described above where the teeth have shifted away from the edge and have come to lie entirely on the dorsal surface.

Unfortunately no Meloidae or Rhipiphoridae are known from the Galapagos and it is impossible to determine positively the systematic position of the larvae. There are no records which I can find of Xylocopa bearing triungulins in other places where these bees are abundant, but as I hope to show from their structure in conjunction with published records of Meloid beetles reared from the nests of Xylocopa in other parts of the world, the presumptive evidence is very strong that the Galapagos triungulins are those of *Horia maculata* Swed.

In general form, tarsal structure and by the presence of biocellate eyes they are very similar to the larvae of Sitaris, Hornia and other Sitarini and Zonitini as described by Cros ('20), but the respiratory horns near the apex of the abdomen are entirely lacking and they are present in all the members of these tribes in the first larval stage, so far as is definitely known.[2] As mentioned above the form of the mandibles is also different although easily to be derived from a type which occurs in these tribes.

The triungulins of several Meloini are well known and were familiar objects to several of the earlier entomologists. They were observed by Goedart, DeGeer, Kirby and Dufour (who first called them triungulins in 1828), and as early as 1845 Newport was able to explain their presence attached to the bodies of bees on the basis of their larval habits. Later the larva of Meloë was studied by Riley ('77), by Beauregard ('90) and notably by Cros in several recent papers. The legs terminate in three similar curved claws, of equal thickness or sometimes with the median one stouter and straight, two types very aptly termed by Cros "en fourche" and "en trident de Neptune." The head bears a single eye on each side and the abdomen is furnished with long caudal bristles. Obviously the present larva does not belong to this group, although some species

[2] Williams and Hungerford ('14) figure a triungulin which they suspected was that of Hornia, but this is quite likely referable to some other genus of Meloidae.

are bee-parasites and are regularly found attached to the bees. All do not cling to the hairs, however, and one remarkable species, *Meloë cavensis*, actually perforates the intersegmental membrane of the bee by forcing its flat and pointed spiny head between the abdominal plates of its unhappy mount.

Triungulins of a number of genera of the tribe Lyttini are known but none have been found attached to Hymenoptera as they appear to depend entirely upon their own powers of locomotion to locate their hosts. The claws are bifid or tripartite and the eyes are placed far forward, on the anterior half of the head. Our larvae could hardly be referred to this group.

The early larva of the small tribe Horiini is known through a careful study of Bugnion ('09) on the larva of the Ceylonese *Cissites testaceus* and by supplementary details given later by Cros ('20). This larva resembles that of the Zonitini-Sitarini, but lacks the apical abdominal horns, although it is supplied with two caudal setae. The eyes are composed of a single ocellus according to Cros, but there is a suggestion of the eye being double in Bugnion's figure. The leg claws are bifid, consisting of a stout claw with a smaller appendage at the base. In all, the larva is very similar to the Xylocopa-parasite which I have described, and furthermore Cissites inhabits the nests of Xylocopa. Bugnion obtained his material from the galleries of the common Indian *X. tenuiscapa* Westw., with which it has been known to occur since 1833 when Westermann found it in Xylocopa nests where he mistook it for the primary agent excavating the wood. The main differences between Cissites and the form in question from the Galapagos lies in the bi-ocellate eye of the latter, as well as the smaller bristle at the base of the tarsal claw (*cf.* Fig. 31, c.) and in the dention of the mandibles, which are said to be feebly denticulate on the edge in Cissites by Cros, although Bugnion failed to detect any teeth and described them as smooth.

According to Gahan ('08) the genus Cissites is restricted to the Old World, and the Neotropical species which are very closely related are to be placed in Horia. Horia was found associated with Xylocopa nearly a century ago by that well known naturalist and keen observer, the Rev. Landsdown Guilding ('25) on the island of Barbados. He described the later larva of a Horia which he referred to *H. maculata* Swed., but which according to Champion ('92) was undoubtedly that of *H. auriculata* Dugès. Guilding also shows one

of the large brightly marked beetles on the colored plate which accompanies his paper. It is now evident that Guilding was correct in his belief that the Horia is parasitic in the nests of the New World Xylocopas, just as Cissites is in those of Africa and Asia. Champion was not inclined to accept the accuracy of Guilding's conclusions, for he says, in referring to *Horia auriculata* (*loc. cit.* p. 372: "Specimens of this species were chiefly obtained by me in the open verandahs of houses, and on more than one occasion I have observed the insect crawling on the wood-work in the close vicinity of the

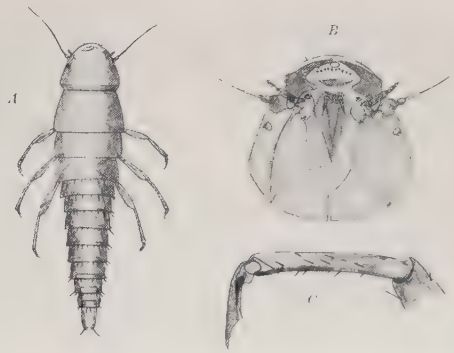

FIG. 31. Triungulin of *CISSITES TESTACEUS* Fabr.
A, dorsal view; B, ventral view of head; C, tibia and tarsus of hind leg. (after Bugnion)

nests of a large blue wasp, these nests being commonly found in such places. It is probable, therefore, that *H. auriculata* really preys upon this wasp, and not upon Xylocopa."

There can be little question that the triungulins which I have described belong to *H. maculata* or possibly to some as yet undescribed species, for *maculata* occurs from Mexico southward to Ecuador, while *auriculata* is not known south of Costa Rica.

One other record of a Meloid associated with Xylocopa has come to my attention. This is an observation by Davidson ('07) and relates to the North American *Nemognatha scutellaris* Lec. which he reared from a cell of Xylocopa, probably *X. orpifex*, as well as from another bee of the genus Alcidamea.

The first stage larvae of the family Rhipiphoridae are not so well known as those of the Meloidae, but those of several genera have been described with considerable care. Like some of the Meloids, Rhipiphorus (*Myodites* auct.) is parasitic on various bees

(Melander & Brues '03; Pierce '04). The triungulin of *R. solidaginis* Pierce has been figured by Silvestri ('06) whose drawing is reproduced in the accompanying figure (Fig. 32, B). It will be seen that this larva is extremely similar in nearly all details to the supposed Horia from Xylocopa described above. Silvestri does not state from whence his specimens came, but as he does not question the identification there is presumably no reason to doubt its accuracy. In his figure of the head three ocelli are shown on one side and two on the other, the larger number being characteristic of Rhipiphoridae

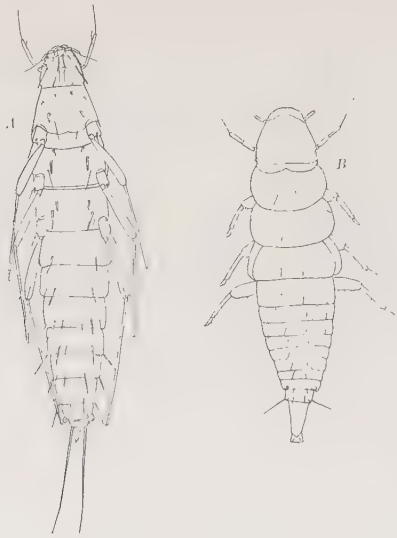

FIG. 32. A, triungulin of *RHYZOSTYLOPS INQUIRENDUS* Silv. Ventral view (after Silvestri)
B, triungulin of *RHIPIPHORUS SOLIDAGINIS* Pierce. Dorsal view (after Silvestri)

and two being characteristic of certain Meloids. The mandibles do not appear to bear any teeth. Pierce's figures ('04) are not sufficiently detailed to show the form of the eyes, nor of the tarsal claws in this species, but he describes the leg as "terminated by a curved claw, almost concealed by a large semi-transparent elliptical pulvillus of twice its length," which is certainly very different from the tarsus in the Meloidae. The first larva of Rhipidius has been several times observed and *R. denisi* Chobaut is well figured by Chobaut ('19). It may be considered together with *Rhyzostylops inquirendus* Silvestri ('06). The latter is a very aberrant Rhipiphorid known

only from the extremely degenerate female and the first-stage larva. Silvestri considered this insect as more or less intermediate between Rhipidius and the Strepsiptera. The triungulins of these two genera are remarkably similar (fig. 32, A, Rhyzostylops). The legs are more slender than those of the Meloidae, with long thin tibia, tipped by a pair of extremely minute claws, the eyes are multi-ocellate and the body is heavily bristled. In at least some species of Rhipidius (Murray '70), there is a large pulvillus between the tarsal claws. The mandibles are simple, without teeth.

In another Rhipiphorid, Macrosiagon (=*Emenadia*) which occurs in the nests of certain solitary wasps (Odynerus, Eumenes, etc.) there is a pulvillus also, much as in Rhipiphorus.

The structure and arrangement of the claws of the legs of Meloid and Rhipiphorid triungulins is of particular interest in connection with the possible relationship of these beetles to the Strepsiptera. The triungulins of the latter are usually destitute of claws on the legs, which are tipped with flattened sucker-like pads. In some Strepsiptera, however, two pairs of legs bear the terminal sucker while the other is provided with a single claw. This is the case in *Xenos nigrescens* Brues as figured in a former paper ('05) and a recent re-examination of these triungulins leaves no doubt as to the actual dissimilarity of the legs, the hind pair each with a claw and the four anterior legs each with a terminal disc. The same arrangement occurs in an undetermined genus "allied to Xenos" figured by Perkins ('05) and in Stylops.

Terminal pads on all three pairs of legs occur also in some Strepsiptera, at least they have been so figured in Stichotrema (Pierce '18). Single claws on all the legs are present in several genera, *e. g.*, Elenchus (Perkins '05), Pentozocera (=*Bruesia* Perk.) (Perkins '05) and in *Stylops californica* Pierce (Pierce '18) although the presence of discs on the four anterior legs of some other species of Stylops would make it seem probable that *S. californica* must represent another genus.

Triple claws on each leg have been found by Pierce ('18) in Callipharixenos which thus approaches the typical Meloid triungulin in tarsal structure, although the claws are very delicate and appear as three slender filaments attached to a distinct elongate tarsal joint.

Thus it will be seen that the Strepsipteran triungulins show a great variation in regard to the terminal armature of the legs and

exhibit no constant character which will serve to distinguish them from those of either the Meloidae or Rhipiphoridae. There appears to be no distinguishing characteristic in the presence of long caudal setae as these while present in all Strepsiptera are as well developed in many Meloids and Rhipiphorids. Whether the difficulty of distinguishing the larvae of the two groups indicates genetic relationship is of course not altogether clear, but the many similarities strengthen the opinion held by many entomologists that the Strepsiptera are more closely related to the Coleoptera than to any other group of insects.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

BIBLIOGRAPHY.

AUDOUIN, J. V.
'35 Observations sur la manière de vivre des larves de *Sitaris humeralis* Ann. Soc. Entom. France, vol. iv, bull. p. lxxvii.

BARBER, H. S.
'15 *Macrosiagon flavipenne* in Cocoons of *Bembex spinolae*. Proc. Entom. Soc. Washington, vol. xvii, pp. 187–188.

BEAUREGARD, H.
'90 Les Insectes Vésicants. Paris. 1 vol. 8vo.

BRUES, C. T.
'05 Notes on the Life History of the Stylopidae. Biol. Bull., vol. viii, pp. 290–295, 2 figs.

BUGNION, E.
'09 Le *Cissites testaceus* Fabr. des Indes et de Ceylon; métamorphoses, appareil génital. Bull. Soc. Entom. Egypt, 1909, fasc. 4, pp. 182–200, 3 pls.

CHAMPION, G. C.
'92 Biologia centrali-americana, Coleoptera, vol. 4, pt. 2, p. 372.

CHOBAUT, A.
'91 Moeurs et métamorphoses de *Emenadia flabellata* F. Ann. Entom. Soc. France, vol. ix, pp. 447–456, 1 fig.
'19 Description des deux sexes, de l'oeuf et de la larve primaire d'un nouveau Rhipidius de Provence. Bull. Soc. Entom. France, 1919, p. 200–206, 2 figs.

CROS, AUG.

'10 Contribution à l'étude des espèces algériennes du genre Meloë. Bull. Soc. Hist. Nat. Afr. Nord, vol. ii.

'17 Forme des ongles des larves primaires des Meloidae et valeur du terme "Triongulin." Ann. Ent. Soc. France, vol. lxxxvi, pp. 159–164, 5 figs. (Several earlier papers of the author are listed on p. 160 of the above.)

'19 *Nemognatha chrysomelina* F. La larve primaire. Bull. Soc. Hist. Nat. Afrique du Nord, vol. x, pp. 55–61.

'20 Contribution à l'étude des Rhipiphorides Algériens. *Macrosiagon tricuspidata* (*Emenadia bimaculata*) Bull. Soc. Hist. Nat. Afrique du Nord, vol. xi, pp. 56–68, 70–75.

'20 Notes sur les larves primaires des Meloidae avec indication de larves nouvelles. Ann. Ent. Soc. France, vol. lxxxviii, pp. 261–279.

DAVIDSON, A. C.

'07 Beetles from Bee Cells. Entom. News, vol. xviii, p. 446.

DUFOUR, L.

'28 Description d'un genre nouveau d' insectes de l' ordre des Parasites. Ann. Sci. Nat., vol. xiii, pp. 62–66, 4 figs. on pl. 9.

FABRE, M.

'57 Mémoire sur l' hypermétamorphose et les moeurs des Méloides. Ann. Sci. Nat. Zool., (4) vol. vii, pp. 299–365, 1 pl.

'58 Nouvelles observations sur l' hypermétamorphose et les moeurs des Méloides. Ann. Sci. Nat. Zool., (4) vol. ix, pp. 265–276.

GAHAN, C. J.

'08 Notes on the Coleopterous Genera Horia and Cissites and a List of the Described Species. Ann. Mag. Nat. Hist., (8) vol. ii, pp. 199–204.

GUILDING, LANSDOWNE.

'25 The Natural History of *Xylocopa teredo* and *Horia maculata*. Trans. Linn. Soc. London, vol. xiv, pp. 313–317, 1 pl.

MAYET, V.

'75 Moeurs et métamorphoses du *Sitaris colletis*. Ann. Soc. Entom. France, (5) vol. v, pp. 65–92, 1 pl.

MELANDER, A. L. & C. T. BRUES.

'03 Guests and Parasites of the Burrowing Bee Halictus. Biol Bull., vol. v, pp. 1–27, 7 figs.

MURRAY, M.

'70 Some Facts Toward a Life History of *Rhipidius paradoxus*. Ann. Mag. Nat. Hist., (4) vol. vi, pp. 314–328, 1 pl.

PERKINS, R. C. L.

'05 Leaf-hoppers and their Natural Enemies. Bull. Div. Entom. Hawaiian Sugar Planters' Assoc., No. 1, pt. 3, pp. 90–111, 4 pls.

PIERCE, W. D.

'04 Some Hypermetamorphic Beetles and their Hymenopterous Hosts. Univ. Nebraska Studies, vol. iv, pp. 153–190, 2 pls.

'18 Comparative Morphology of the Order Strepsiptera, together with Records and Descriptions of Insects. Proc. U. S. Nat. Mus., vol. liv, pp. 391–501, 15 pls.

RILEY, C. V.

'77 On the Larval Characters and Habits of the Blister-beetles belonging to the Genera Macrobasis Lec. and Epicauta Fabr., with Remarks on other Species of the Family Meloidae. Trans. St. Louis Acad. Sci., vol. 3, pp. 544–562. (Reprinted in First Rept. U. S. Entom. Comm., pp. 293–302 (1878) 1 pl. 5 figs.

'79 Notes on the Life History of the Blister-beetles, and on the Structure and Development of Hornia. Proc. Amer. Assoc. Adv. Sci. for 1878, vol. xxvii, pp. 284–285.

SILVESTRI, F.

'06 Descrizione di un nuovo genere di Rhipiphoridae. Redia, vol. iii, pp. 315–324, 1 pl.

WESTERMANN, B. W.

'33 Ueber die Lebensweise der Insekten in Ostindien und am Kap; Schreiben an Wiedermann. Germar Magaz. Entom., pp. 411–427, pl. 4.

WESTWOOD, J. O.

'39 Introduction to the Modern Classification of Insects. Vol. i, pp. 298–299.

WILLIAMS, F. X. & H. B. HUNGERFORD.

'14 Notes on Coleoptera from western Kansas. Entom. News., vol. xxv, pp. 1 9, 2 pls.

ZANON, V.

'22 La larva triungulina di *Meloë cavensis* (Petagna) dannosa alle api in Cirenaica. L'Agric. Colon., Florence, vol. xvi, pp. 345–354, 5 figs.

Zoologica Vol. V, No. 12.

CHILOPODS

OF THE WILLIAMS GALAPAGOS EXPEDITION

By Ralph V. Chamberlin

(Plate VI, figs. 1–4)

This expedition, initiated and financed by Mr. Harrison Williams, was sent out under the auspices of the Department of Tropical Research of the New York Zoological Society. While but few centipedes were secured by Mr. William Beebe and his associates on this expedition, these represent two of the three species previously recorded from this archipelago, and, in addition, two new species, one of which typifies a new genus in the family Schendylidae. Thus the number of species now known from these islands is raised to five. Four of these species are indigenous.

In a previous paper (Psyche, 1914, 21, p. 85) the writer erroneously listed, among species from the Galapagos Islands, *Cryptops navigans* Chamberlin and *Mecistocephalus parvus* Chamberlin; but these forms were, in fact, taken on Clipperton Island, which lies fifteen hundred miles north-west of the Galapagos group.

The only one of the five species not represented in the present collection is *Orphnaeus brevilabiatus* (Newport). This is a very common geophiloid throughout the warmer parts of both hemispheres. One specimen of it was taken on Hood Island by the Stanford Expedition of 1898–99.

The types of new species are in the Department of Tropical Research of the New York Zoological Society.

Family CRYPTOPIDAE

Cryptops beebei, sp. nov.

General color yellowish.

Head with sides subparallel over the middle portion. Without paired sulci.

First dorsal plate with a cervical sulcus which is angularly bent back at the middle. Paired longitudinal sulci extend from caudal margin to the cervical sulcus. Each longitudinal sulcus is furcate at its anterior end.

Paired sulci present on the second and subsequent tergites. Last plate with a median longitudinal depression which does not extend to the caudal angle.

Prosternum not punctate or distinctly furrowed. Anterior margin convex; bearing 4 + 4 setae of which the ectal on each side is reduced or may

First form on press April 28, 1924.

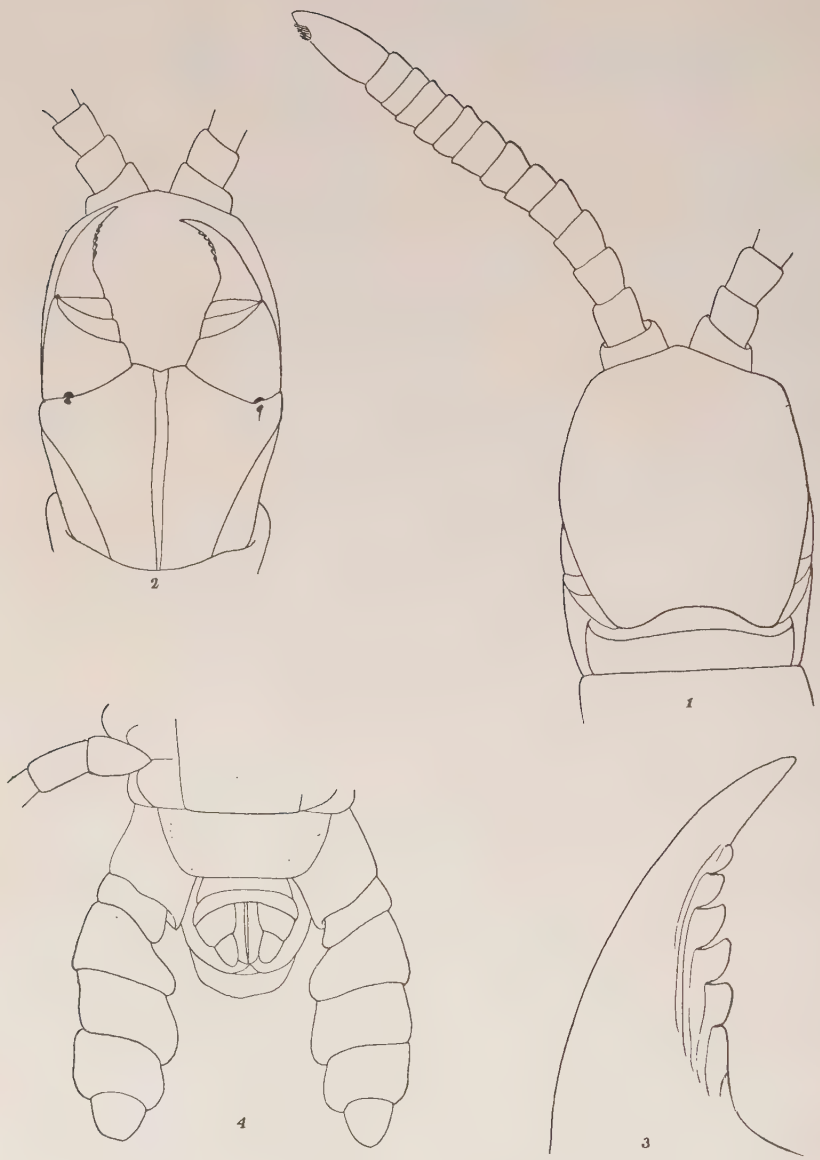

PLATE VI. *NANNOPODELLUS PURPURASCENS*, sp. nov.

1, anterior end, dorsal view; 2, prehensors, ventral view; 3, claw of right prehensor, ventral view, more highly enlarged; 4, caudal end, ventral view.

be indicated only by the basal nodule. A little caudad of the anterior margin are in addition 2 + 2 bristles. Elsewhere the setae are short and sparse.

Ventral plates smooth, not punctate. Last ventral plate trapeziform, the sides convex, more strongly rounded toward and about the posterior corners; caudal margin a little convex.

Coxopleurae caudally subtruncate.

Spiracles moderate, in part a little longitudinally elliptic.

Tarsi of anterior legs uniarticulate.

Third joint of last legs armed ventrally and laterally with numerous spines and spinescent setae of which the ventral ones are stouter; ventral surface with a median longitudinal space free from spines. Fourth joint with similar but fewer spines and with a similar spine-free median space. Fifth joint (tibia) with a series of four ventral teeth. The sixth joint with two ventral teeth. Ultimate joint bearing only setae.

Length, 16 mm.

Locality.—Tower Id. Two specimens taken 28 April, 1923.

In characters of the anal legs this species resembles *Cryptops navigans* Chamberlin of Clipperton Id. From that species, however, it is readily distinguished in having paired sulci on the first as well as on the second tergites, in having setae on the anterior margin of the prosternum, etc. The present species is named for Mr. William Beebe, leader of the expedition, by which the types were secured.

Family SCOLOPENDRIDAE

Scolopendra galapagoensis Bollman

Proc. U. S. Nat. Mus., 1889, 12, p. 214.

Scolopendra galapagoensis Chamberlin

Psyche, 1914, p. 86.

In the stomach of a Galapagos hawk, *Buteo galapagensis*, shot on South Seymour, April 19th, 1923, were found the well-preserved posterior portions of five specimens of this large centiped. Heads and anterior segments were missing. From a second hawk, killed at the same place and on the same date, fragments of two other individuals of this centiped were removed. In this case the head end of one specimen is present and entire, while of the second specimen the head proper is missing although the poison-jaws are present. Fragments, including head of another specimen of the same species, were found in the stomach of a short-eared owl, *Asio galapagensis*, taken April 28th, 1923 on Tower Id.

This species would seem to be the most abundant, or at least certainly the most conspicuous, chilopod of the Galapagos Is. It was previously recorded from Hood, Chatham, Bindloe, Narborough, and Albemarle Islands.

Family SCHENDYLIDAE

Pectiniunguis albemarlensis Chamberlin

Pectiniunguis americanus Chamberlin (nec Bollman)

Ent. News, 1913, p. 122.

Pectiniunguis albemarlensis Chamberlin

Psyche, 1914, 21, p. 86; *Proc. Cal. Acad. Sci.*, 1923, ser. 4, 13, p. 394, f. 3.

This species was based upon a single female specimen with 61 pairs of legs which was taken upon Albemarle Id. by R. E. Snodgrass while a member of the Stanford Galapagos Expedition of 1898–'99. Two additional specimens were taken on Tower Id. by the Williams Expedition on the 18 and 27 April, 1923, respectively. These are likewise females. One, with sixty-one pairs of legs, has the prebasal plate exposed and the coloration normal. It is 62 mm. long. The other individual has 65 pairs of legs and has the prebasal plate covered, apparently by artificial retraction of the cephalic plate in the alcohol. The cephalic plate is somewhat differently shaped and the antennae are shorter. The geminate black dorsal stripe is absent or only vaguely indicated in the posterior region. It is 45 mm. long.

Nannopodellus, gen. nov.

Mandibles with a dentate lamella which is typically tripartite.
Labrum pectinate at sides, truly dentate(?) at middle.
Claw of the palpi of the second maxillae with margins pectinate.
Sternites without pore-areas.
Coxopleurae of last legs each with two homogeneous glands.
Anal legs six-jointed; without claws.

Genotype.—*N. purpurascens* sp. nov.

Related to *Nannophilus* in general features, but different in the absence of ventral pores on the sternites. It is at present impossible to say just what relationship the present form bears to the several South American species placed by Silvestri in the genus *Nannophilus*, though it is quite possible they are congeneric. The species clearly referable to *Nannophilus* have been found in the Mediterranean region.

Nannopodellus purpurascens, sp. nov.

(Plate VI, figs. 1–4)

The general ground color is yellowish, but the body is conspicuously marked throughout its length above, below and laterally with numerous purplish marks and dots which tend to form longitudinal stripes.

The head shows no frontal suture. It is longer than wide in the ratio 8 : 7, and is widest at middle of its length. Caudal margin incurved. Anterior margin obtusely angular. (fig. 1.)

Antennae 1.8 times as long as the cephalic plate. The ultimate article as long as, or longer than, the three preceding articles taken together. (fig. 1.)

Prebasal plate exposed.

Basal plate very short, its exposed area rather more than five times as wide as long. (fig. 1.)

Claws of prehensors when closed not attaining front margin of head; unarmed at base but serrate along mesal side of middle portion as shown in figs. 2 and 3. Proximal joints of prehensors unarmed. Prosternum as exposed a little wider than long, without definite chitinous lines.

The last ventral plate very wide; covering the coxal pores on each side. Pores evident only after special clearing of the specimen. (See further, fig. 4.)

Anal legs of male very stout. (fig. 4.)

Pairs of legs in the male, fifty-three.

Length, about 16 mm.

Locality.—South Seymour Id., 20 April, 1923.

One male which is in poorly preserved condition.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a *f*olume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

Zoologica Vol. V, No. 13.

THE COCCIDAE
OF THE WILLIAMS GALAPAGOS EXPEDITION

By Harold Morrison

Bureau of Entomology, U. S. Department of Agriculture, Washington, D.C.

(Figs. 33 to 37 incl.)

This expedition was sent out by the Department of Tropical Research of the New York Zoological Society. The Coccidae reported on below were very kindly offered to the writer for study by their collector, Dr. William Beebe, who has also furnished all the collection data quoted for the different species represented.

The writer is indebted to Miss Amalia Shoemaker for the accompanying figures showing the structural details of the newly described species.

In spite of its very obvious deficiencies, the scheme of classification given in the Fernald Catalogue of the Coccidae of the World, 1903, has been followed in assigning the species to genera and subfamilies.

Subfamily Margarodinae

Genus *Margarodes* Guilding

Margarodes similis sp. nov.

Adult Female.—(Description drawn up from fragments of one specimen only.) Nothing available regarding the normal external appearance, actual size or shape of body; the single antenna available 5-segmented, with the 4th segment incompletely divided twice, the antennae therefore probably normally 7-segmented; measurements of the segments in microns as follows: I, 71; II, 61; III, 22; IV, 100; V, 64; antennae beset with the usual stout spines and setae, not displaying any apparent peculiarities; legs characteristic for the genus, the thickened claw of the posterior pairs somewhat more slender than the same part in the legs of the nearest known relative, *rileyi;* mouthparts presumably wanting; thoracic spiracles very considerably larger than the abdominal, with a distinct lateral chitinous bar and four or perhaps more bilocular center, multilocular disk pores within the external opening, and two tiny pores externally immediately adjacent to the opening; abdominal spiracles much smaller, tubular, each with a pore collar of about 4, similar, bilocular center pores, spiracles presumably present in seven pairs, although only a single spiracle available for examination; derm pores nearly circular, with a large quinquilocular center surrounded by a band of smaller loculi, this in turn surrounded by a heavy

First form on press April 28, 1924.

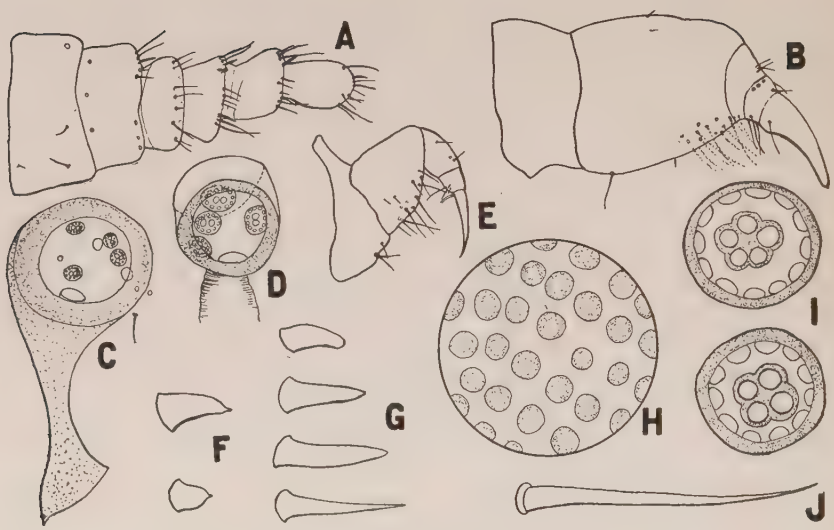

FIG. 33. *MARGARODES SIMILIS*, sp. nov.

A, antenna, × 120; B, fore leg, × 60; C, thoracic spiracle, × 230; D, abdominal spiracle, × 530; E, middle leg, × 60; F, body spines of *Margarodes rileyi*, for comparison × 530; G, body spines, × 530; H, derm, showing papillae, × 530; I, detail of disk pore, × 1500; J, detail of body seta, × 530; all adult female.

collar; no other sorts of derm pores except those described in connection with the spiracles located; all of the derm available for examination bearing many, rather crowded, uniformly distributed, slightly convex to nearly hemispherical papillae; derm with numerous, moderately stout spines with apices varying, according to the stoutness, from acutely to almost obtusely pointed, and with numerous rather stout setae; the arrangement of these spines and setae not ascertainable from the fragments available for study; anal tube not available and no ventral cicatrices evident.

Immature Female Tests.—Of moderate size, made up of more or less distinctly overlapping layers, golden to reddish-brown in color, not differing in any evident particulars from the tests of *M. rileyi* and *M. formicarum.*

This species has been described from a single, very fragmentary, adult female and from a considerable number of tests of the immature stage female collected by Dr. William Beebe with the following data: "from rootlets of *Maytena*, Seymour Bay, Indefatigable, April 25" (Invert. no. 2263) (holotype adult female and intermediate female tests); "from roots of yellow-plumed ground plant, Eden Island, N. W. Coast of Indefatigable, April 8th" (Invert. no. 2219); "from debris under *Bursera* close to beach, South Seymour, northeast of Indefatigable, April 19th" (Invert. no. 2262); "Seymour Bay, Indefatigable," no date, host nor number; (all of these last represented by female tests only).

The type female and a number of the tests are in the U. S. National Collection of Coccidae.

This species, on the basis of the material available for study, is extremely closely related to *M. rileyi* Giard, as this species is identified from the Florida Keys, differing positively, so far as can be observed, only in having the body spines normally pointed at apices and without the nipple-like continuation of each spine apex which appears to be characteristic of *M. rileyi*.

Subfamily ORTHEZIINAE

Genus *Orthezia* Bosc.

Orthezia galapagoensis Kuw.

This species of *Orthezia* is represented in the collection by two lots of material as follows: "from stems of *Heliotropium parviflorum*, Seymour Bay, Indefatigable, April 25" (Invert. no. 2369) and on "*Bursera*, Duncan, April 25" (Invert. no. 2390).

Subfamily DACTYLOPIINAE

Genus *Eriococcus* Targ.

Eriococcus papillosus sp. nov.

Sac of Female.—Broad oval, moderately convex, the single sac available appearing, after immersion in alcohol, thin and fragile, white; length about 3 mm., width about 2 mm.

Adult Female.—Length as mounted 2.5 mm., width 1.7 mm.; oval, tapering more or less distinctly at apices; derm clearing completely on treatment with caustic potash, except for anal lobes; antennae normally 6-segmented, the measurements in microns of the segments of those available for examination as follows: I, uncertain, due to distortion; II, 36–46; III, 104–118; IV, 22–25; V, 18–25; VI, 36–40; beak and spiracles not unusual for the genus, the former about 100 μ wide and 140 μ long; legs not unusual for the genus, the measurements of a middle leg in microns as follows: coxa about 114, trochanter 75, femur 157, tibia 132, tarsus 118, claw 36, tarsal digitules 54, claw digitules 39; tarsal digitules longer and stouter than those of claw, all distinctly knobbed at apices, tarsal claw with the usual denticle; anal lobes not unusually large nor prominent for the genus, chitinized, with the usual three dorsal spines, two ventral setae, and an apical seta, the latter about 286 μ long; anal ring with the usual single complete row of pores and eight setae, the longest of these about 121 μ; preapical setae of anal lobes about 96 μ long; body bearing rather numerous large spines over the dorsum as well as at the margin, these, on the abdomen at least, arranged in more or less distinct transverse segmental bands, with spines of smaller size interspersed between the larger, all these spines stout and only slightly constricted at base, tapering almost uniformly to a slender but bluntly rounded tip; those of anal lobes proportionately distinctly more slender than the remainder; longest anal lobe spine about 40 μ in length, largest marginal spine about 54 μ in length, largest dorsal spines about 50 μ in length, smallest dorsal spine about 22 μ in length; large tubular ducts with the tube of average length, the inverted cup wide and fairly deep, these ducts scattered in segmental arrangement over the dorsal surface, and at the margins ventrally; body also

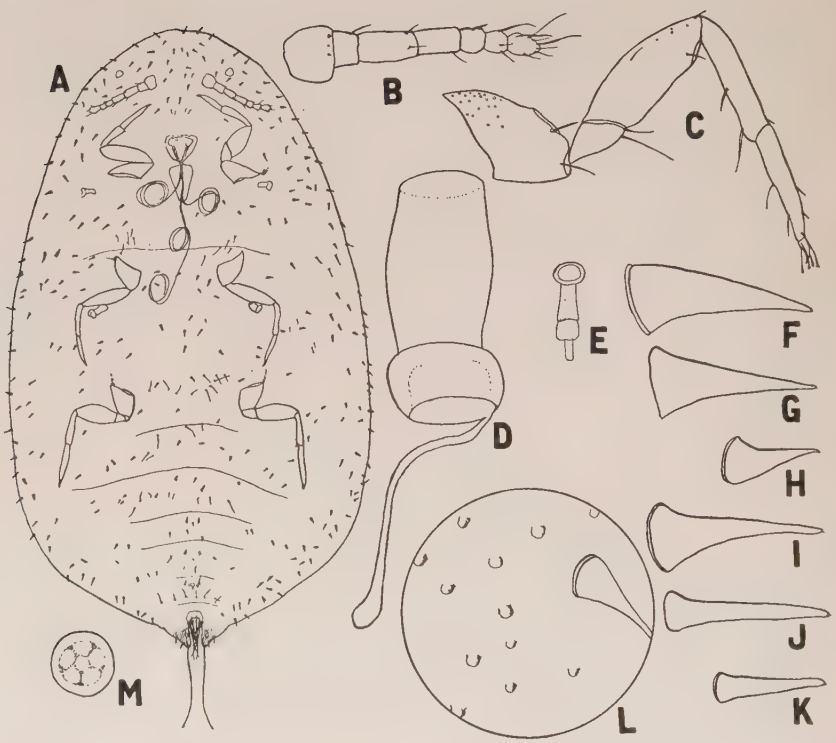

FIG. 34. *ERIOCOCCUS PAPILLOSUS*, sp. nov.

A, outline of body, optical section, showing appendages, spines and larger setae, × 40; B, antenna, × 120; C, posterior leg, × 120; D, large tubular duct, × 1500; E, small tubular duct, × 1500; F, marginal spine, × 530; G, large dorsal spine, × 530; H, small dorsal spine, × 530; I, apical anal lobe spine, × 530; J, outer anal lobe spine, × 530; K, inner anal lobe spine, × 530; L, portion of derm showing papillae, × 530; M, disk pore, × 1500; all adult female.

with minute symmetrical tubular ducts dorsally, but in much fewer numbers than the preceding; ventrally with smaller, quinquilocular disk pores; derm dorsally and at margins bearing numerous, but scattered, tiny papillae or tubercles rather uniformly distributed over the whole area; largest ventral abdominal seta about 50 μ.

No other stages available for examination.

This species has been described from two specimens mounted on slides, collected in the Galapagos Islands in company with a large number of specimens of *Orthezia galapagoensis* and having the following data: "From stems of *Heliotropium parviflorum*, Seymour Bay, Indefatigable, April 25." (Invert. no. 2369.)

The types are in the U. S. National Collection of Coccidae.

Of the species of the genus *Eriococcus* with which the writer is familiar,

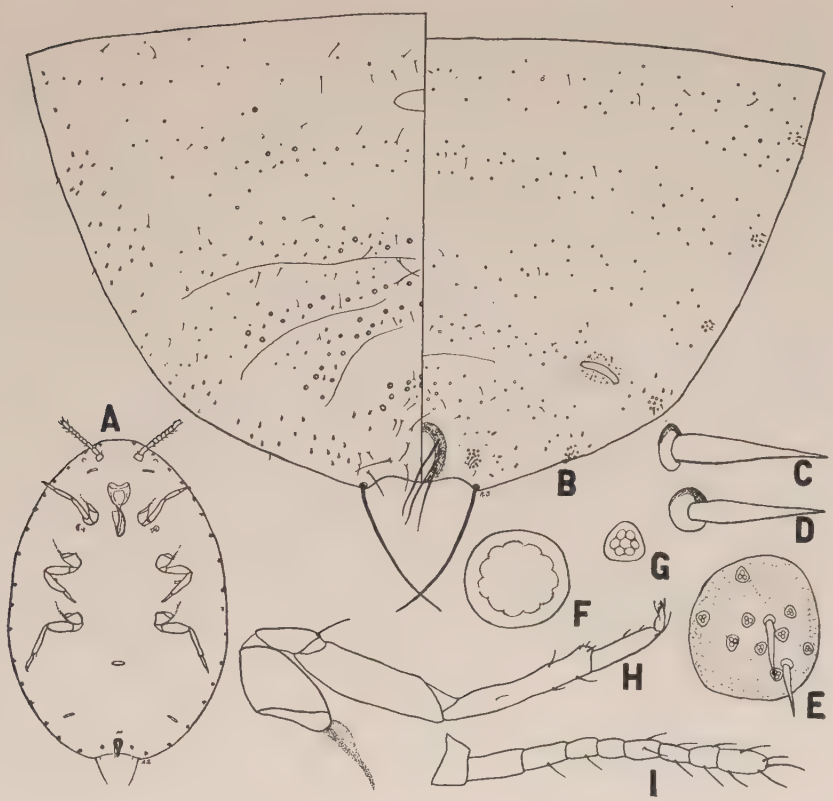

FIG. 35. *PHENACOCCUS PARVUS*, sp. nov.

A, outline of body, optical section showing position and relation of parts, × 21; B, apex of abdomen, dorsal and ventral, × 88; C, apical cerarian spine, × 1500; D, penultimate cerarian spine, × 1500; E, lateral abdominal cerarius from unexpanded adult, × 530; F, multilocular disk pore, × 1500; G, triangular pore, × 1500; H, middle leg, × 120; I, antenna, × 120; all adult female.

this appears to approach most closely *Eriococcus palmeri* Ckll., described from Lower California, from which species it differs most obviously in the larger size and more elongate and more slender antennae as well as in the possession of the cuticular tubercles, these not being in evidence in *E. palmeri*.

Genus *Phenacoccus* Ckll.

Phenacoccus parvus sp. nov.

Adult Female.—Only alcoholic specimens available for examination, so no description of normal external appearances can be given; length of fully distended specimens as mounted on slide 1.8 to 2 mm.; width 1.2 to 1.3mm.; normal shape either uniformly oval or very slightly broader behind; derm clearing

completely on treatment with potassium hydroxide in old specimens, but retaining faintly suggested indistinct disks below each cerarius in undistended adult females; of the usual Pseudococcine type, antennae normally 9-segmented, the range of measurements in microns of those available for study as follows: I, about 36; II, 46–61; III, 46–53; IV, 32–39; V, 29–36; VI, 29–36; VII, 29–32; VIII, 32–36; IX, 54–61; (segments 4 and 5 incompletely separated in one antenna); legs not unusual, hind coxae without pores, measurement of a middle leg in microns as follows: coxa 125, trochanter 79, femur 186, tibia 190, tarsus 89, claw 29; claw with a distinctly developed denticle about one-third of length from apex, digitules slender, those of claw knobbed, those of tarsus acute at apices; beak elongate, triangular, more or less distinctly 2-segmented, length about 114 μ; with the usual anterior and posterior pairs of slit-like dorsal ostioles; with eighteen pairs of cerarii along the body margin, each of these composed of two slender lanceolate spines and a few (3 to 9) triangular pores, and each underlaid, in newly emerged and undistended adult females only, by a fairly distinct, but only slightly chitinized, circular to oval disk; rarely with one or two smaller dorsal spines approximating the cerarian area so closely as to appear to be a part of the cerarius, average length of cerarian spines 11 μ, spines of apical cerarii about 17 μ long, correspondingly larger than the others on the body and accompanied by more triangular pores than any other cerarii; apical setae of anal lobes about 196 μ long; without ventral chitinized thickenings on anal lobes, but with several setae of various sizes ventrally just anterior to the apical setae; anal ring bearing six setae averaging about 107 μ in length and each half composed of an inner scalloped band of irregularly shaped larger pores and an outer band of nearly uniformly rounded, smaller, but less heavily chitinized, pores; dorsally, at least in the abdominal region, with transverse segmental rows of scattered triangular pores and slender lanceolate spines, the former much more abundant than the latter; with tubular ducts of moderate size surrounding the cerarii dorsally and ventrally at the body margin and extending in transverse segmental bands of scattered ducts across the ventral abdominal segments; with five transverse segmental rows of scattered large circular disk pores ventrally in the abdominal region; also ventrally with transverse segmental single rows of setae of different sizes; with a single, transversely oval to quadrate, cicatrix.

No other stages of this species have been available for examination.

This species has been described from four mounted specimens collected "on bush near shore, Tover, Apr. 28" (Invert. no. 2413).

The types are in the U. S. National Collection of Coccidae.

The present state of the classification of *Phenacoccus* and related genera is such that the writer can make no precise suggestions regarding the relationships of the species described above. Its structural characters appear to be quite commonplace, leaving its comparatively small size the most evident feature of the species.

Pseudococcus galapagoensis sp. nov.

Adult Female.—Only alcoholic specimens available for examination, so nothing regarding the external appearance can be given; length 3.5 mm., width 2 mm.; elongate oval, apices tending to be pointed; antennae normally

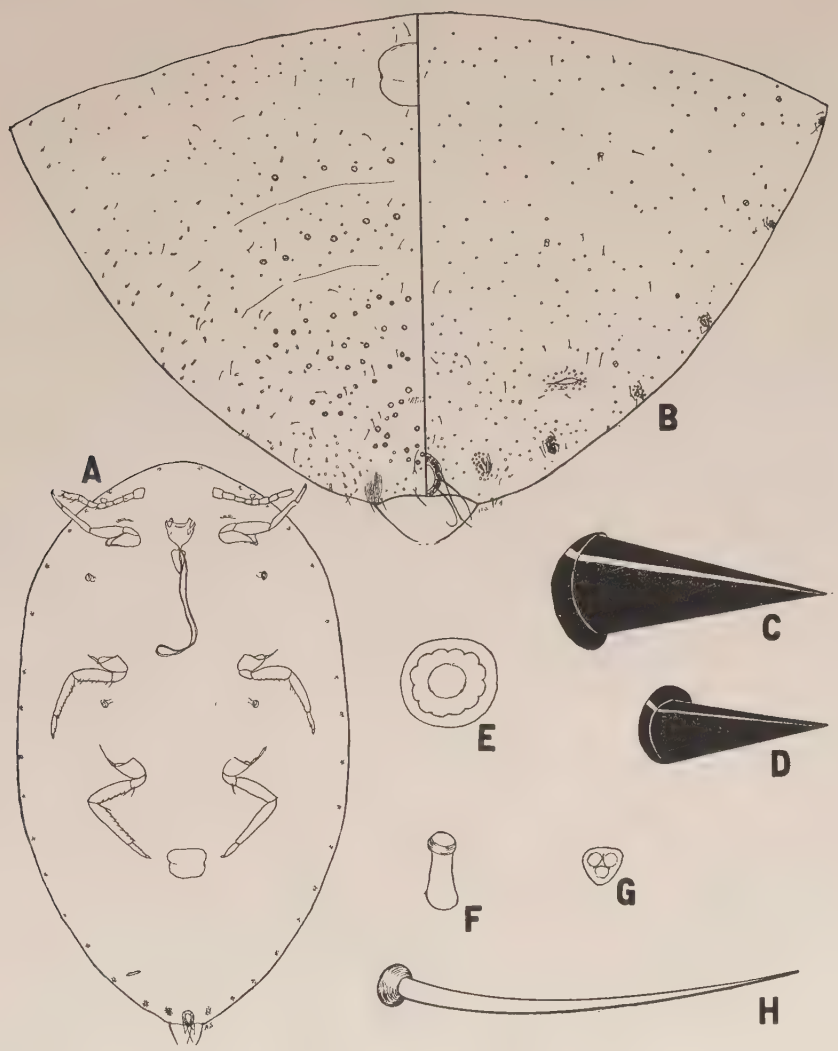

FIG. 36. *PSEUDOCOCCUS GALAPAGOENSIS*, sp. nov.

A, outline of body, optical section, × 21; B, posterior apex of abdomen, dorsal and ventral, × 60; C, apical cerarian spine, × 1500; D, penultimate cerarian spine, × 1500; E, multilocular disk pore, × 1500; F, small tubular duct, × 1500; G, triangular pore, × 1500; H, body seta, × 1500; all adult female.

8-segmented, lengths of segments in microns as follows: I, 64; II, 78; III, 68; IV, 43–46; V, 46–57; VI, 39–43; VII, 39; VIII, 93–96; legs not unusual, lengths of parts of middle leg in microns as follows: coxa 196, trochanter 107, femur 268, tibia 278, tarsus 103, claw 36; claw without denticle, both tarsal and claw

digitules slightly knobbed at apices, those of claw distinctly stouter near base, hind coxa without distinctly developed, enlarged pores, although both coxa and femur with some such enlarged pores or aerolations faintly suggested; beak elongate triangular, distinctly 2-segmented, length 171 μ, width at base 114 μ; with the usual two pairs of dorsal ostioles, the anterior pair relatively inconspicuous; with 17 pairs of cerarii, the typical arrangement of each consisting of two spines surrounded by a cluster of pores and, at outer margin of this, 4 setae, this arrangement varying however, as few as three pores and one seta being present; spines of posterior cerarii distinctly larger and stouter than any of the others, the size of these gradually reduced anteriorly; a tabulation of the cerarian spines showing the following count: I (anterior), 3; II, 2; III, 2–3; IV, 1–2; V, 2; VI, 2–3; VII to XVII inclusive, 2 each; pores in the anal lobe cerarii fairly closely crowded, those in the other cerarii more scattered; apical seta of anal lobes about 121 μ long, ventral surface of anal lobes with a small, not very distinctly chitinized, thickening; anal ring with the usual inner and outer rows of pores and with six setae, these averaging about 130 μ in length; derm dorsally, at least in the abdominal region, with triangular pores and some small setae, and, on some abdominal segments, with an enlarged tubular duct just within each cerarius and another similar duct about half way between the center line and each of the submarginal ducts; ventrally with larger setae and large multilocular disk pores in definite transverse rows in the abdominal region, clusters of small short tubular ducts around and between the cerarii, mostly on the ventral surface, and similar ducts and triangular pores scattered over the mid-ventral area; the single ventral cicatrix quite large and more or less distinctly quadrate with rounded corners.

This species has been described from a single mounted specimen having the following data: "from roots of a yellow-plumed ground plant, Eden Island, N.W. coast of Indefatigable, April 8" (Invert. no. 2204).

The type is in the U. S. National Collection of Coccidae.

Pseudococcus insularis sp. nov.

Adult Female.—Only alcoholic specimens available for examination, so nothing regarding normal external appearances can be given; length as mounted on slide 3.4 mm., width 1.9 mm.; body elongate oval, tapering somewhat posteriorly; antennae of the normal Pseudococcine type, 8-segmented, measurements in microns of the segments available for study as follows: I, 64–68; II, 89; III, 86–89; IV, 57; V, 57–64; VI, 50; VII, 46; VIII, 107; legs of the usual Pseudococcine type, hind coxae without pores, length in microns of a middle leg as follows: coxa about 160, trochanter 125, femur 300, tibia 300, tarsus 107, claw 36; claw without denticle, claw digitules fairly distinctly knobbed at apices, tarsal digitules very slightly knobbed; beak fairly stout-conical, indistinctly 2-segmented; with the usual anterior and posterior pairs of slit-like dorsal ostioles; differing from the normal Pseudococcus type in the possession of only fifteen pairs of cerarii, each of these composed of triangular pores, accessory setae and spines, the latter running as follows in the cerarii examined: I, 3; II, 3; III, 3; IV, 2; V, 2; VI, 2–3; VII–XV, 2 each; number of accessory setae varying from 1 to 4 in the anterior and lateral cerarii, increasing to 5 in the

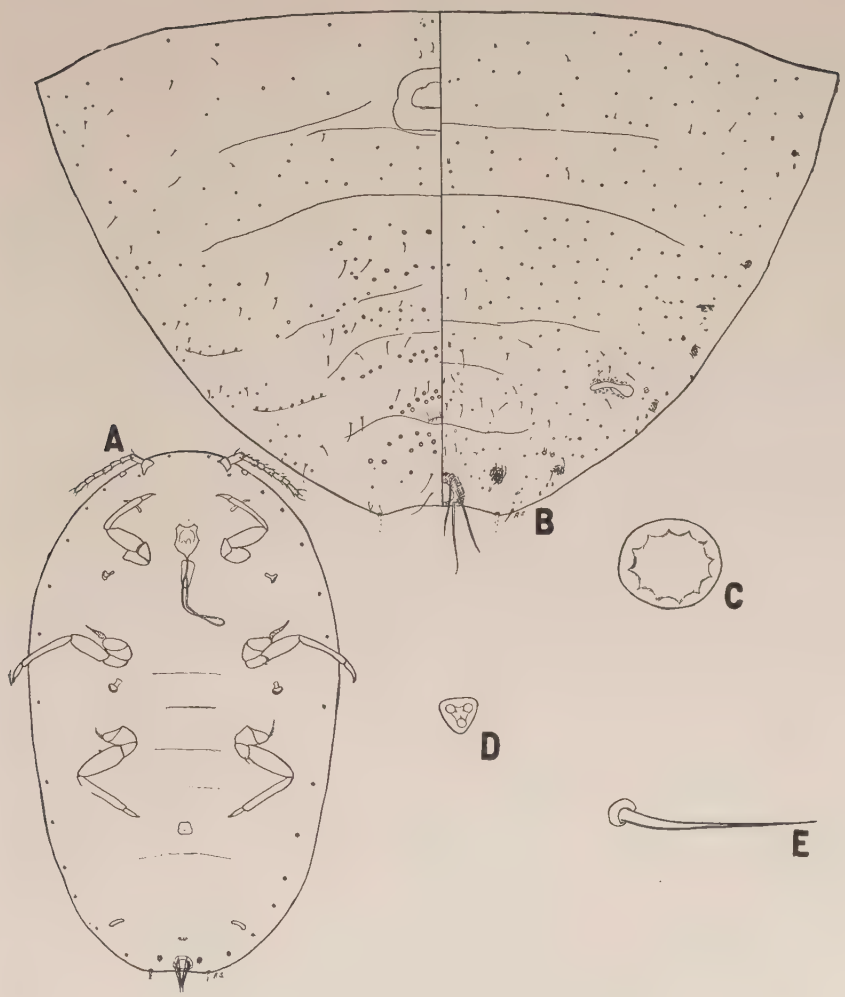

FIG. 37. *PSEUDOCOCCUS INSULARIS*, sp. nov.

A, outline of body, optical section, × 21; B, apex of abdomen, dorsal and ventral, × 60; C, multilocular disk pore, × 1500; D, triangular pore, × 1500; E, body seta, × 1500; all adult female.

anal lobe cerarii; spines of anal lobe cerarii conspicuously larger than any of the others, those of the preapical cerarii intermediate in size, the remaining cerarian spines much smaller and more slender; triangular pores of apical cerarii closely crowded to form a dense oval cluster surrounding the spines, those of the remaining cerarii distinctly but not widely separated from one another; apical setae of anal lobes broken, but probably, from diameter of socket, longer than

those of anal ring; anal ring setae about 160 μ long; no ventral chitinous thickenings on the anal lobes; dorsally, at least in the abdominal region, with transverse segmental rows of widely scattered slender setae and much more numerous but scattered segmental bands of triangular pores, also, at least on some segments, with one or two median and one or two submarginal dorsal enlarged tubular ducts; ventrally, at least in the abdominal region, with seven transverse rows or clusters of large circular disk pores, with indistinct clusters of widely separated small tubular ducts beneath each cerarius and with more or less distinctly developed, transverse rows of widely scattered triangular pores, smaller tubular ducts and slender setae; anal ring rather narrow, with six setae and the usual inner and a single outer row of pores; ventral cicatrix large, more or less distinctly quadrate, with rounded corners, somewhat constricted transversely about the middle.

This species has been described from a single mounted specimen collected "under stone near brackish water pool, South Seymour, Apr. 20" (Invert. no. 2272).

The holotype is in the U. S. National Collection of Coccidae.

The insect above described rather closely resembles the preceding species, differing, however, in presumably important characteristics, in that it has only 15 pairs of definitely developed cerarii and has no visible ventral chitinized thickening on the anal lobes. There are also apparent differences in the relative and actual numbers of the various types of pores present but the constancy of such differences has not thus far been established.

Subfamily Coccinae

Ceroplastes sp.

Two lots of specimens of a species of *Ceroplastes* were included with the material examined. The outer waxy covering of a few of the specimens was in fairly good condition, but only fragmentary portions of the female body could be obtained for study purposes. While the species does not appear to agree with any of the described forms with which the writer is familiar and is quite probably undescribed, the material available does not permit the preparation of an adequate and satisfactory description.

The following data accompanied the two lots of material: "from bag of earth and leaves taken from under *Maytena* bushes on Eden Island, N.W. of Indefatigable, Apr. 8, 1923" (Invert. no. 2183) and "Under lava, Seymour Bay, Indefatigable, April 25" (Invert. no. 2552).

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

Zoologica Vol. V, No. 14.

BRACHYURAN CRABS
COLLECTED BY THE WILLIAMS GALAPAGOS EXPEDITION, 1923

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(Plate VII. Fig. 38)

The collection numbers 23 species, 12 of these being from the Galapagos and the remainder from the Atlantic side of Panama and the vicinity of Key West.

There are several interesting occurrences. Two very small crabs are referable to *Xanthias insculpta,* a species not reported since the type from Lower California was described by Stimpson. The author had in hand but one individual, which is no longer extant, having probably been destroyed with extensive collections by the Chicago fire of 1871.

The grey box crab, *Calappa convexa,* had not up to this time been taken at the Galapagos. Its occurrence there was to be expected, as the crustacean fauna of the archipelago is in great part identical with that of the adjacent mainland.

Colon is a new locality for the seemingly rare fiddler crab, *Uca heterochelos,* although this is not an extension of its range.

It is a satisfaction to report a new form of megalops, referable probably to the Galapagos sand crab, thus adding another bit of knowledge to that little known subject, the development of the crab from the egg to the mature crab form.

Mithrax bellii Gerstaecker. (Moss-back Crab).

Mithrax ursus Bell, *Proc. Zool. Soc. London, vol.* 3, 1835 (1836), *p.* 171 (not *Cancer ursus* Herbst, 1788); *Trans. Zool. Soc. London, vol.* 2, 1836, *p.* 52, *pl.* 10, *figs.* 2, 2*c*, 2*d*, 2*e and* 3.

Mithrax bellii Gerstaecker, *Arch. f. Naturg., vol.* 22, *part* 1, 1856, *p.* 112.

Eden Island, Galapagos Islands, in rock pools, April 6; 1 young male, with carapace 11.7 mm. long, 10.3 wide. The young of this species are almost concealed by a dense mosslike covering of setae, which largely disappears with age; the carapace also grows broader until its breadth exceeds the length. The young have only five marginal spines.

Range.—Galapagos Islands; Chile.

First form on press April 28, 1924.

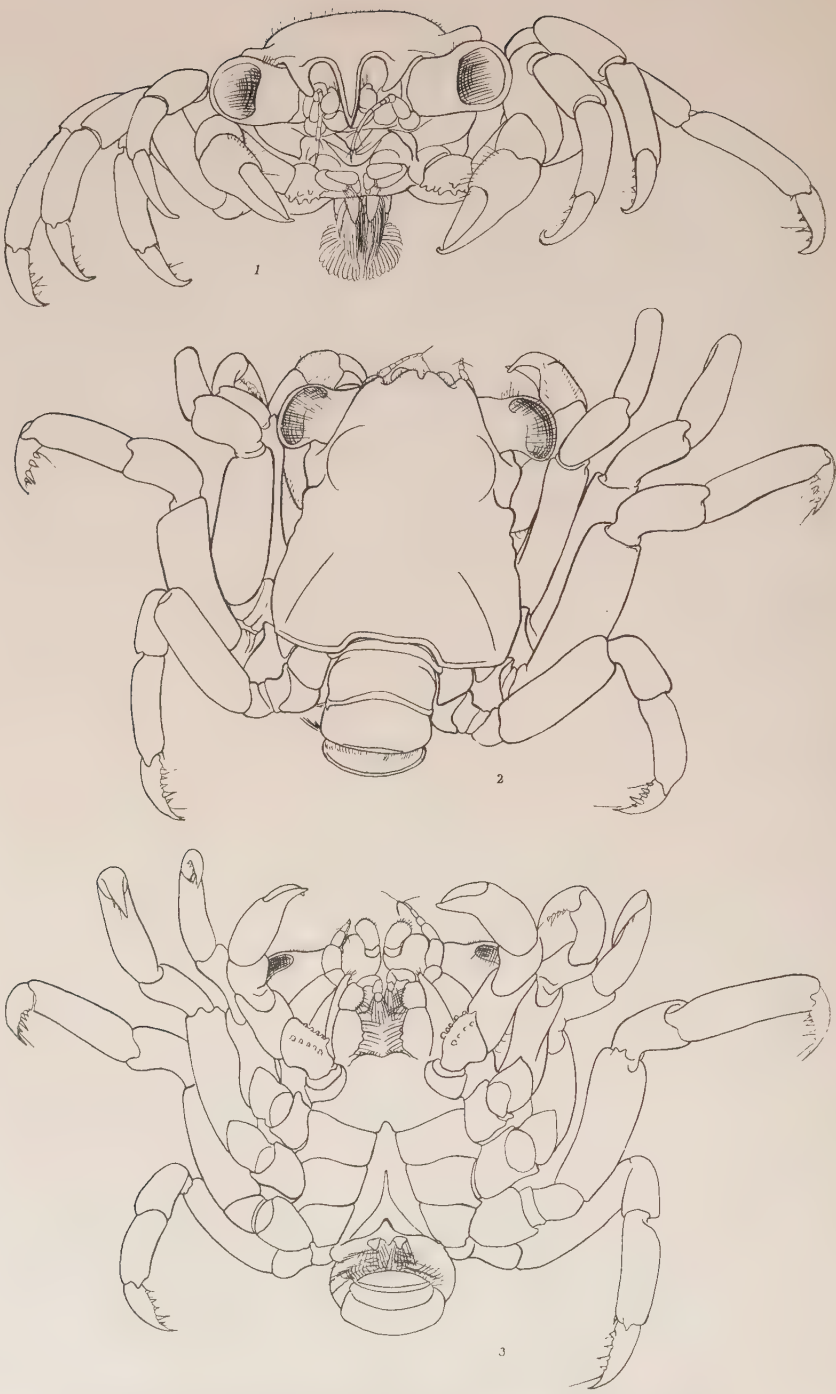

PLATE VII. MEGALOPS OF (?) *OCYPODE GAUDICHAUDII*.
From surface of a puffer in a pool at Eden Island. Carapace 4.6 mm. long. 1, front view; 2, dorsal view; 3, ventral view. Drawn by C. J. Fish.

Ocypode albicans Bosc. (Ghost Crab or Sand Crab).

Ocypoda albicans Bosc, *Hist. Nat. Crust.*, *vol.* 1, *an X* (1801–1802), *p.* 196, *not pl.* 4, *fig.* 1.

Ocypode arenarius Say, *Journ. Acad. Nat. Sci. Philadelphia*, *vol.* 1, 1817, *p.* 69.

Ocypode albicans Rathbun, *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 367, *pls.* 127 *and* 128.

Colon, Panama; 2 males (1 young).

This is the common sand crab of the eastern coast of America, ranging from Block Island to Brazil.

Ocypode gaudichaudii Milne Edwards and Lucas.

Ocypode gaudichaudii Milne Edwards and Lucas, *d'Orbigny's Voyage dans l'Amér. Mérid.*, *vol.* 6, 1843, *Crust.*, *p.* 26; *vol.* 9, *atlas*, 1847, *pl.* 11, *figs.* 4–4*b*.

(Plate VII, figs. 1–3).

A small crab was taken from the surface of a puffer, *Spheroides annulatus*, in a pool at Eden Island. It proved to be a megalops, or one of the later developmental stages of a crab; it is similar to a known megalops of *Ocypode albicans*, and for that reason I have ventured to give it the name of the only sand crab occurring at the Galapagos, viz.: *O. gaudichaudii*. In the adult of this species the eyes are remarkable in having a slender style projecting from them; this style may be as long as the eye and its stalk.

The carapace of the megalops is 4.6 mm. long, 4 mm. wide. Its sides are high and are crossed obliquely by three furrows into which as many ambulatories may fit; between the first (or anterior) and the second groove, there is a prominent, rectangular, hepatic tubercle; on the branchial region on the posterior margin of the second groove there is a sharp oblique ridge. The mesogastric and cardiac regions are each set off by deep grooves; the mesogastric is partially divided into three parts. The front is deeply cut into three narrow, deflexed lobes, of which the lateral are only half as long as the median lobe. A deep median groove extends forward from the gastric region. The body is covered with pigment spots which are larger anteriorly and diminish in size and number posteriorly, being very few on the sixth abdominal somite and absent from the telson. The raised portions of the carapace are covered with a short pubescence, while a transverse line of hairs crosses the branchial and anterior cardiac regions. The posterior border of the first six abdominal somites is fringed with short hair, and of the pleopods with long hair.

The ambulatories are sparingly dotted with fine pigment spots which thin out distally, being absent from the dactyls and upper half of the propodites. Five spines below each dactyl, the second spine from the tip being the longest. No hairs between bases of second and third ambulatories.

Uca galapagensis Rathbun. (Broad-fronted Fiddler Crab).

Uca galapagensis Rathbun, *Proc. Washington Acad. Sci.*, *vol.* 4, 1902, *p.* 275, *pl.* 12, *figs.* 1 *and* 2; *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 403, *pl.* 142, *text-fig.* 167.

James Island, common about salt ponds, April 4; 3 males, 1 female, all very small.

South Seymour Island, April 21, 1 male from a salt pool, 1 female from the beach.

Indefatigable Island, April 25; 1 male.

Eden Island; 1 male.

This is the larger of the two fiddlers that inhabit the Galapagos.

Uca heterochelos (Lamarck). (Narrow-fronted Fiddler Crab).

Ocypoda heterochelos Lamarck, *Syst. Anim. sans Vert.*, 1801, *p.* 150.
Gelasimus heterocheles, Kingsley, *Proc. Acad. Nat. Sci. Philadelphia*, 1880, *p.* 137, *pl.* 9, *fig.* 2 (*part*).
Uca heterochelos Rathbun, *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 381, *pl.* 131, *figs.* 1 *and* 2.

Colon; 1 male, half grown.

This is one of the groups of fiddlers in which the front between the eyes is very narrow, tongue-like. While the species ranges from the Bahamas to Brazil, it has not before been noted from Panama.

Cardisoma guanhumi Latreille. (Large Land Crab).

Cardisoma guanhumi Latreille, *Encyc. Méth., Hist. Nat., Entom., vol.* 10, 1825, *p.* 685. Rathbun, *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 341, *pls.* 106 *and* 107, *text-fig.* 155.

Colon; 1 male. Found in great numbers, all having the same light blue color. Widely distributed on the Atlantic coast of America, from Bahamas to Brazil.

Gecarcinus lateralis (Freminville). (Small Land Crab).

Ocypoda lateralis Freminville, *Ann. Sci. Nat., ser.* 2, *Zool., vol.* 3, 1835, *p* 224.
Gecarcinus lateralis Guérin, *Icon. Régne Anim., pl.* 5. *fig* 1. Rathbun, *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 355, *pls.* 119 *and* 120, *text-fig.* 161.

Colon; 1 female. This species is considerably smaller than the *Cardisoma* and is always of a deeper, richer color. It ranges on the Atlantic coast from the Bahamas to Guiana.

Grapsus grapsus (Linnaeus). (Rock Crab).

Cancer grapsus Linnaeus, *Syst. Nat., ed.* 10, *vol.* 1, 1758, *p.* 630.
Grapsus grapsus Ives, *Proc. Acad. Nat. Sci. Philadelphia*, 1891, *p.* 190. Rathbun, *Bull.* 97, *U.S. Nat. Mus.*, 1918, *p.*227, *pls.*53 *and* 54, *text-fig.* 135.

Eden Island, off Indefatigable Island; 1 male, 1 female.

Indefatigable Island; 1 young female.

Common in the tropics on rocky shores on both sides of the American continent.

Geograpsus lividus (Milne Edwards). (Small Rock Crab).

Grapsus lividus Milne Edwards, *Hist. Nat. Crust., vol.* 2, 1837, *p.* 85.
Geograpsus lividus Stimpson, *Ann. Lyc. Nat. Hist. New York, vol.* 7, 1860, *p.* 230. Rathbun, *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 232, *pl.* 55.

Tower Island, Galapagos; 1 young.

A smaller, and duller-colored form than the preceding; it has acutely pointed fingers instead of spoon-shaped ones. Found on both sides of the continent.

Goniopsis cruentata (Latreille). (Mangrove Crab).

Grapsus cruentatus Latreille, *Hist. Nat. Crust.*, *vol.* 6, 1803, *p.* 70.
Goniopsis cruentatus Rathbun, *Bull. U. S. Fish. Comm.*, *vol.* 20, *for* 1900, *pt.* 2 (1901), *p.* 15, *pl.* 1 (*colored*); *Bull.* 97, *U. S. Nat. Mus.*, 1918, *p.* 237, *pl.* 57, *text-fig.* 136.

Colon, Panama; 1 young specimen.

This crab can be told by its brilliant coloring in connection with the flashing white outer surface of its palms.

Planes minutus (Linnaeus). (Sargassum Crab).

Cancer minutus Linnaeus, *Syst. Nat.*, *ed.* 10, *vol.* 1, 1758, *p.* 625.
Planes minutus White, *List Crust. Brit. Mus.*, 1847, *p.* 42.

Off eastern Cuba, in *Sargassum*, 13 specimens from four different stations. For variations in this widely distributed species, see Verrill, *Trans. Connecticut Acad. Sci.*, *vol.* 13, 1908, *p.* 325, *pl.* 13.

FIG. 38. *XANTHIAS INSCULPTA* STIMPSON.
Immature male, carapace 4 mm. wide. Off Eden Island.

Xanthias insculpta (Stimpson). (Sculptured Crab).

Xanthodes insculpta Stimpson, *Ann. Lyc. Nat. Hist. N. Y.*, *vol.* 10, 1871, *p.* 105.
Xanthias insculptus Rathbun, *Bull. Labor. Nat. Hist. State Univ. Iowa*, *vol.* 4, 1898, *p.* 271.

Off Eden Island, 5 fathoms; 1 immature male, 1 young.

This species was known hitherto only from the type from Cape St. Lucas. The larger of the Galapagos specimens is about the same size as the type. The species probably grows much larger. The gastric and frontal regions are deeply lobulated, the antero-lateral regions and also the dorsal aspect of the wrist and palm are lumpy. There are four equal, small, but well-marked teeth on the antero-lateral margin of the carapace behind the orbital angle, and a

small tooth at the outer end of each of the frontal lobes. There is a longitudinal ridge through the middle of the palm and above it a few obsolescent transverse ranges of minute granules. The dark color of the immovable finger is continued back on the palm for a ways.

Extreme length of carapace 3 mm., width 4 mm.

Xanthodius lobatus (A. Milne Edwards). (Oblong Crab).

Leptodius lobatus A. Milne Edwards, *Crust. Rég. Mex.*, 1880, *p.* 271, *pl.* 49, *fig.* 4.

Eden Island, rock pools; 1 male. Inhabits Clarion Island and Chile as well as the Galapagos.

Menippe nodifrons Stimpson. (Stone Crab).

Menippe nodifrons Stimpson, *Ann. Lyc. Nat. Hist. N. Y*, *vol.* 7 1859 *p.* 53 Rathbun, *Bull. U. S. Fish Comm.*, *vol.* 20, *for* 1900, *pt.* 2 (1901), *p.* 37.

A young specimen of this species was taken from the dock piles at Colon Harbor.

Ozius verreauxii Saussure.

Ozius verreauxii Saussure, *Rev. et Mag. de Zool.*, *ser.* 2. *vol.* 5, 1853, *p.* 359. *pl.* 12, *fig.* 1.

Indefatigable Island, April 25; 1 male.

Is found also on the mainland from Lower California to Ecuador.

Eriphia granulosa A. Milne Edwards.

Eriphia granulosa A. Milne Edwards, *Crust. Rég. Mex.*, 1880, *p.* 339, *pl.* 56. *fig.* 2.

Eden Island, rock pools, April 6; 1 young.

This species has been recorded from Chile as well as the Galapagos Islands.

Eriphides hispida (Stimpson). (Red-Bristle Crab).

Eriphia hispida Stimpson, *Ann. Lyc. Nat. Hist. N. Y.*, *vol.* 7, 1860, *p.* 218. *Pseuderiphia hispida* A. Milne Edwards, *Crust. Rég. Mex.*, 1880, *p.* 340, *pl.* 56, *fig.* 1.

Eden Island; 1 female. Known from Central America, Panama and the Galapagos.

Portunus sayi (Gibbes). (Sargassum Crab).

Lupa sayi Gibbes, *Proc. Amer. Assoc. Adv. Sci.*, *vol.* 3, 1850, *p.* 178 [14]. *Neptunus sayi* A. Milne Edwards, *Arch. Mus. Hist. Nat.*, *Paris*, *vol.* 10, 1861, *p.* 317, *pl.* 29, *fig.* 2.

This is the common pelagic swimming crab of the Atlantic; 5 specimens were taken at 3 stations off eastern Cuba, in *Sargassum*.

Callinectes danae Smith. (Brown Swimming Crab).

Callinectes danae Smith, *Trans. Conn. Acad. Sci.*, *vol.* 2, 1869, *p.* 7. Rathbun, *Proc. U. S. Nat. Mus.*, *vol.* 18. 1895, *p.* 357, *pl.* 16; 26, *fig.* 4: 25, *fig.* 3; 26, *fig.* 3; 27, *fig.* 3.

Colon; 1 male. Extends from Florida to Brazil. Differs from the common edible or "blue" crab of our coast, by its dull color, four teeth instead of two on its front margin between the antennae, by the greater width of the circumscribed area in the middle of the carapace, and by other less evident characters.

Cronius ruber (Lamarck). (Red Swimming Crab).

Portunus ruber Lamarck, *Hist. Nat. Anim. sans Vert.*, *vol.* 5, 1818, *p.* 260.
Cronius ruber Stimpson, *Ann. Lyc. Nat. Hist. N. Y.*, *vol.* 7, 1860, *p.* 225.
Achelous ruber A. Milne Edwards, *Arch. Mus. Hist. Nat., Paris*, *vol.* 10, 1861, *p.* 345, *pl.* 23, *fig.* 1.

Off Eden Island, 5 fathoms, April 1; 1 young specimen.

This form appears to be indistinguishable on opposite sides of the continent. It ranges from South Carolina to Brazil and from Lower California to Ecuador.

Cronius tumidulus (Stimpson). (Small Swimming Crab).

Achelous tumidulus Stimpson, *Bull. Mus. Comp. Zoöl.*, *vol.* 2, 1871, *p.* 149.
Cronius bispinosus Miers, *Challenger Rept.*, *Zool.*, *vol.* 17, 1886, *p.* 188, *pl.* 15, *fig.* 2.

Off eastern Cuba, in Sargassum; 4 young specimens.

This is not one of the two so-called "Sargassum crabs," but a much more uncommon swimming crab than *Portunus sayi*. *C. tumidulus* has been found sparingly from the Bahamas to Bahia.

Calappa convexa Saussure. (Grey Box Crab).

Calappa convexa Saussure, *Rev. et Mag. de Zool.*, *ser.* 2, *vol.* 4, 1853, *p.* 362, *pl.* 13, *fig.* 3.

Eden Island; 1 male. This is known from Cape St. Lucas to Ecuador.

Calappa flammea (Herbst). (Purple-striped Box Crab).

Cancer flammeus Herbst, *Natur. Krabben u. Krebse*, *vol.* 2, 1794, *p.* 161, *pl.* 40, *fig.* 2; *vol.* 3, *part* 3, 1803, *p.* 19.
Calappa flammea Bosc, *Hist. Nat. Crust.*, *vol.* 1, 1802, *p.* 185. Rathbun, *Bull. U. S. Fish Comm.*, *vol.* 20, *for* 1900, *pt.* 2 (1901), *p.* 84, *pl.* 2.

Key West; 1 male. This is the common box crab of our Atlantic coast, from North Carolina to Brazil.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

THE MACRURA AND ANOMURA
COLLECTED BY THE WILLIAMS GALAPAGOS EXPEDITION, 1923

By Waldo L. Schmitt

Curator of Marine Invertebrates, U. S. National Museum, Washington, D. C.

(Figs. 39–41 incl.)

This collection, though not large in point of numbers, is of great interest in its extension of our knowledge of the carcinological fauna of the Galapagos Islands. In the crustacean collections made by the Hopkins Stanford Galapagos Expedition of 1898-99, and reported on by Dr. Mary J. Rathbun[1] there were five macrurous forms not represented in the present one. On the other hand it gives us five new records for the Islands, two of which, *Hippolyte williamsi* and *Lysmata galapagensis* are apparently undescribed species, in addition to two already known from the Galapagos, but not returned by the Hopkins Expedition. En route three well-known species of Sargassum shrimps were taken at several stations in West Indian waters, and a familiar fresh-water crayfish, or rather shrimp, from the Canal Zone.

Penaeopsis kishinouyei (Rathbun).

Parapenaeus kishinouyei Rathbun, *Proc. Washington, Acad. Sci., vol.* 4, 1902, *p.* 288, *pl.* 12, *figs.* 13–15.
Penaeopsis kishinouyei de Man, "*Siboga*" *Exped., Monog.* 39*a*, *Decapoda, pt.* 1, *Penaeidae*, 1911, *pp.* 8, 55.

Eden, off Indefatigable Island; dredged in five fathoms, April 1; 2 immature females.

Exopodites are present on all the legs, and epipodites on all but the last two pairs. The meri of the fifth legs of the males of the type lot are not notched, and the telson bears three pairs of lateral marginal spines.

The Eden specimens have respectively nine, and eight rostral teeth, counting the gastric one; the antero-lateral angle of the carapace is spinous.

This species is known only from the Galapagos Islands, "the types were taken at Tagus Cove, on the reef north of Tagus Hill, Albemarle Island," while four other specimens collected about the same time were "taken in 2 fathoms in Tagus Cove."

[1] Proc. Washington Acad. Sci., vol. 4, 1902, pp. 275–292, pl. 12, text-figs. 1–4.

First form on press April 28, 1924.

Crangon bouvieri var. *chilensis* (Coutière).

Alpheus bouvieri var. *chilensis* Coutière, *Lenz, Zool. Jahrb., Suppl. vol.* 5, 1902, *p.* 732.

Eden; rock pools, April 6; 1 specimen.

This species hitherto was known only from the three specimens of the type lot from Calbuco, Chile.

Synalpheus nobilii Coutière.

Synalpheus nobilii Coutière, *Proc. U. S. Nat. Mus., vol.* 36, 1909, *p.* 40, *text-fig.* 22.
? *Synalpheus neptunus* Rathbun, *Proc. Washington Acad. Sci., vol.* 4, 1902, *p.* 289.

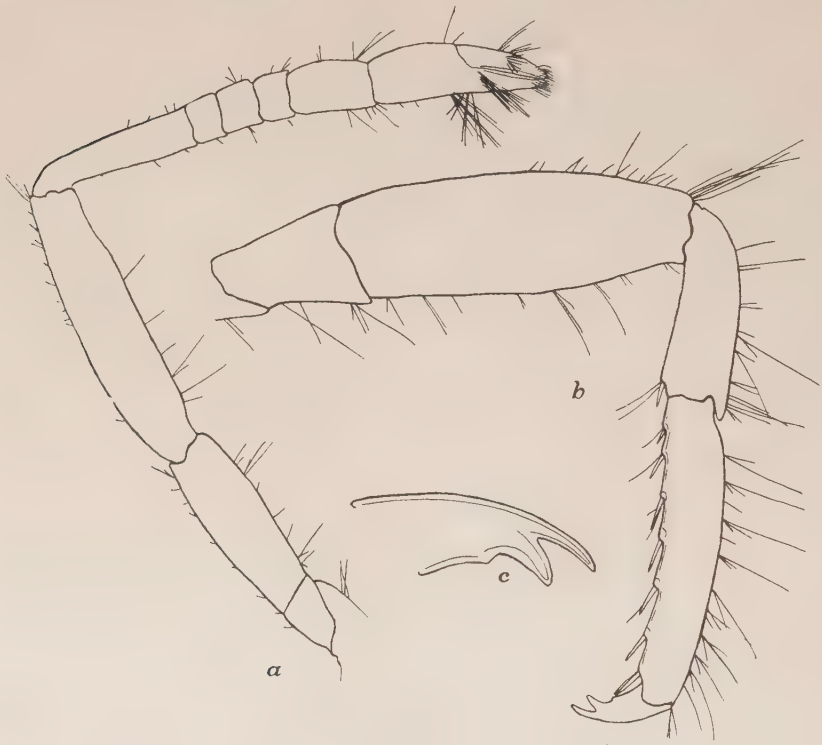

FIG. 39. *SYNALPHEUS NOBILII* COUTIÈRE

a, second leg of right side; *b*, third leg; *c*, dactyl of same, more enlarged.

Eden, rock pools; April 6; 1 specimen.

The large hand of this specimen has much the appearance of that of *S. sanlucasi* Coutière (*op. cit.*, p. 41) with which Miss Rathbun had later identified her material from Albemarle Island. I have been unable to examine those specimens, as they are still in the hands of Prof. Coutière, who is monographing the National Museum Alpheids.

The proportions of the second legs of the specimen before me definitely set it apart from *S. sanlucasi;* and the antennules, antennae, spines, scales, and rostrum have the slender form as in *S. fritzmülleri* and *S. nobilii.* On the basis of the stouter third legs it is identified with the latter rather than the former species.

The only other known specimen of the species is the type in the Paris Museum, from St. Helena, Ecuador.

Hippolyte williamsi sp. nov.[2]

Type Locality.—Eden; rock pools, April 6; 1 ♀ with carapace and rostrum together, but slightly more than 3.5 mm. in length.

Description.—Rostrum reaching four sevenths the length of the antennal scale, exceeding the antennular peduncle by about the length of the first two segments of the thicker flagellum, equalling about three fourths the length of the carapace; above the rostrum has two subequal teeth, the anterior of which is situated just behind the middle of the rostrum, and the first at about the distal third of the interval between the second tooth and the orbital margin; below there are three teeth of which the first is situated just before the distal margin of the first segment of the antennular peduncle, being about as far in advance of the second dorsal as that tooth is in front of the first dorsal, the second ventral is not quite half the distance between the first and third in advance of the former, the last tooth is immediately behind the acute tip, giving it a bifid appearance; on the dorsal margin a little in advance of the first ventral tooth, there is an inconspicuous tiny notch or tooth which might possibly be considered as a third dorsal. The last two joints of the antennular peduncle are subequal; taken together they are shorter than the first joint; antennal peduncle reaching to or just beyond the distal margin of the second antennular segment. Supra-orbital and branchiostegal spines well developed.

Distally, the outer, lateral face of the merus of the third legs is armed with three conspicuous spines, increasing in size from behind forwards, the largest, the anterior spine, is placed lower than the others; fourth leg with two such meral spines, of which the anterior is almost ventral; fifth leg with merus unarmed; carpal joints of last three pairs with a spine on outer face at about one third the length of the joint from the posterior margin; propodus of third leg short and stout, less than three times as long as the dactyl; the dactyls of the last three pairs of legs are quite powerful, stout and well spined, spines terminally quite strong, and set close together; posteriorly, the dactyls are produced, forming a peculiar, unarmed "heel." The third legs fall short of the end of the antennal scale, though they exceed its spine by about the length of the dactyl, the second legs and third maxillipeds reach about as far forward as the distal margin of the first joint of the antennular peduncle.

Fifth abdominal somite about two thirds the length of the sixth, sixth nearly as long as the telson which is slightly shorter than the inner branches of the uropods.

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[2] Named in honor of Harrison Williams, Patron and Curator of Ichthyology of the Department of Tropical Research, New York Zoological Society, whose interest and liberality rendered possible the collection of the material upon which this report is based.

FIG. 40. *HIPPOLYTE WILLIAMSI*, sp. nov.

a, lateral view of carapace; *b*, antennule; *c*, antennal scale; *d*, third maxilliped; *e*, first leg; *f*, second leg; *g*, third leg; *h*, dactyl of same, more enlarged; *i*, telson.

Remarks.—Our species seems to be quite distinct from the other known Hippolytids that may have a similar rostral formula, three teeth below and two or three above. *Hippolyte pleuracantha* (Stimpson)[3] has two to three teeth above and three below, but the legs are much more slender and the dactyls have a different shape, being long and narrow instead of short and broad, they

[3] *Virbius pleuracanthus* Stimpson, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 127. Stimpson described this species as having but one tooth on the inferior margin of the rostrum, as a matter of fact, it has quite uniformly three teeth below.

have slender spines on the ventral margin and lack the "heel" found in *H. williamsi;* the propodus of the third leg of *H. pleuracantha* is about six and one third times as long as its greatest width; in *H. williamsi* it is about four and one half times as long as wide, and the dactyl is armed with short stout spines. In *H. obliqui-manus* Dana[4] from "Rio Janeiro," the dactyl and propodus of the third leg are proportioned as in *H. pleuracantha;* the rostrum has three teeth below if we count the ventral tooth of the bifid tip as figured in with the two described as constituting the armature of the lower margin; above there are four teeth; the rostrum is half again as long as the antennular peduncle. In *H. pleuracantha,* though the rostrum has been generally described as "about half as long as the carapace," "scarcely more than half as long as the acicle," and "reaching to extremity of antennular peduncle," in about half of the specimens I have examined, it is about as long as the scale, exceeding the antennular peduncle by about one half the length of the peduncle. Other than in the possession of a fourth tooth on the upper margin of the rostrum, I can detect but one other feature in Dana's figure of *obliqui-manus,* distinguishing it from *H. pleuracantha.* What might have been intended to represent the branchiostegal spine in the former species is situated on or at the anterior margin of the carapace, while in the latter, the tip of that spine is removed by distance at least half, and usually nearly the length of the spine from the anterior margin. *H. williamsi* has the branchiostegal spine placed so close to the anterior margin of the carapace that in part it extends beyond the margin. Heller's Mediterranean *H. gracilis,*[5] has two to three teeth beneath, and three or four on the upper margin, but of the dorsal teeth, two were described as being "behind the eyes," at least one is on the carapace and the second about over the orbital margin, more or less; the branchiostegal spine is figured as being behind the margin, and the rostrum is about half again as long as the antennular peduncle. *Hippolyte californiensis* Holmes,[6] though it may have as few as three teeth below and the same number above, need not be considered here, because of its vastly different form; the tip of the rostrum is usually trifid, the second joint of the antennular peduncle is two to three times as long as the third and more than twice as long as wide, and the sixth abdominal somite is twice as long as the fifth and longer than the telson.

Lysmata galapagensis sp. nov.

Type Locality.—Northeast of Eden; seven fathoms, dredged, April 6; 56 specimens. The carapace and rostrum of the figured female together are about 6 mm. long.

Description.—Rostrum about four ninths the length of the carapace, as long as, or a little longer than the eyestalks, and reaching the distal margin of the first segment of the antennular peduncle; rostral crest is continued backward onto the anterior third of the carapace; above it is usually armed with five or six, more rarely, seven teeth, of which one, less often two are on the carapace; as in the figured specimen there is always a decided hump between the first and

[4] Crust. U. S. Expl. Exped., pt. 1, 1852, p. 564; atlas, 1855, pl. 36, fig. 3*a–f*.
[5] *Virbius gracilis* Heller, Sitzb. Wiener Akad. Wissen., vol. 45, 1862, p. 397, pl. 1, figs. 19, 20.
[6] Proc. Calif. Acad. Sci., ser. 2, vol. 4, 1895, p. 576, text-figs. 21–26.

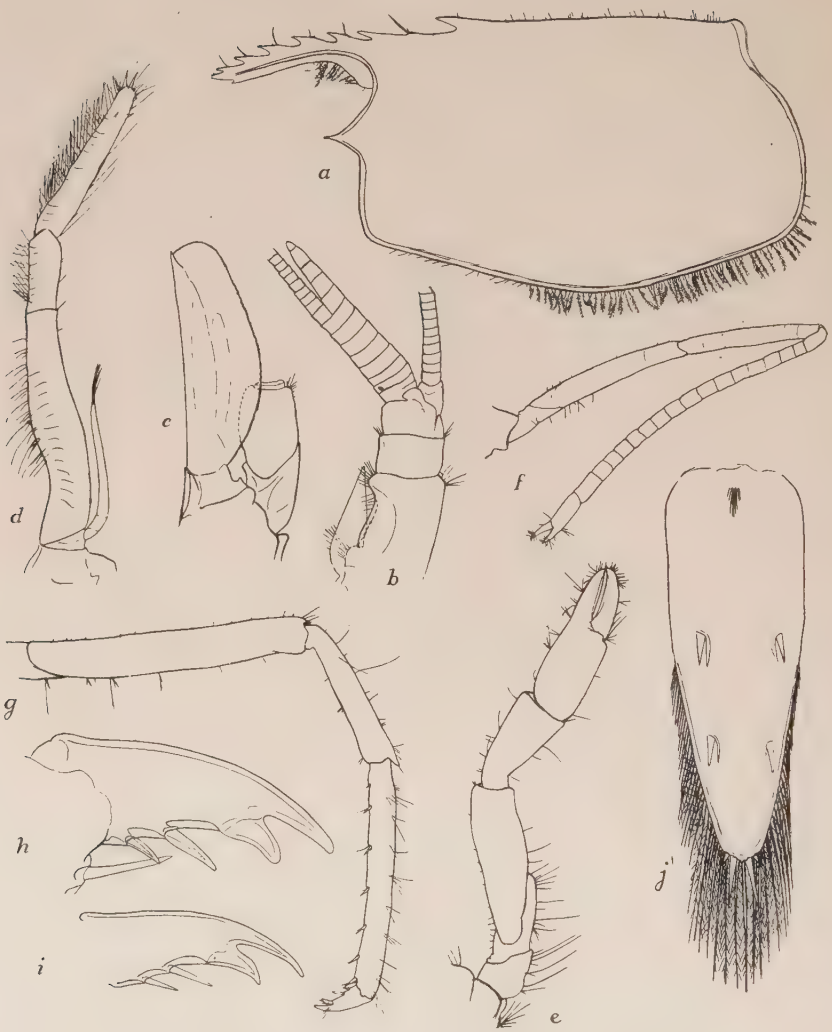

FIG. 41. *LYSMATA GALAPAGENSIS*, sp. nov.

a, lateral view of carapace; *b*, antennule; *c*, antennal scale; *d*, third maxilliped; *e*, first leg; *f*, second leg; *g*, third leg; *h*, dactyl of third leg of another specimen; *i*, dactyl of third specimen; *j*, telson.

second teeth from which arises a conspicuous long hair and maybe one or two smaller ones; similarly hairs occur at about the mid-points of the intervals between the other teeth and the last tooth and the rostral tip as well, but the humps marking their insertion are much less pronounced; the interval between the first and second teeth is as great as between the second and fourth; below

there is sometimes, but not always, a single tiny tooth, close behind the tip of the rostrum, giving it a bifid appearance; posterior dorsal region of carapace with a scattering of short hairs.

The outer antennular flagella are biramus; the free portion of the shorter ramus is composed of three, four or five articles, the fused portion of from six to nine; the second and third articles of the peduncle are subequal and taken together shorter than the basal article; the blade of the antennal scale is broadly rounded and slightly exceeds the spine; mandible without palp or incisor process; third maxillipeds with exopodite, and reaching by nearly half their length beyond the antennal scale; the first legs fall short of antennal scale, the second legs exceed the third maxillipeds and reach about as far forward as the third, exceeding the antennal scale by two thirds of their carpal joints, the third legs extend beyond the scale by the length of the propodus; the carpus of the second legs appears to be divided rather uniformly into seventeen articles, the merus also is annulated, as well as the distal portion of the ischium.

The fifth abdominal somite is not quite three fourths the length of the sixth, and the sixth slightly more than three fourths the length of the telson, the telson is shorter than the uropods.

Remarks.—Kemp has shown in his notes on the "Hippolytidae" of the Indian Museum[7] that *Hippolysmata moorei* Rathbun[8] and *H. intermedia* Kingsley[9] are more properly placed in the genus *Lysmata* on the basis of the bifurcate, outer antennular flagellum. Kemp remarks (*loc. cit.*): "The only difference between this genus and Risso's *Lysmata* is that in the latter the outer antennular flagellum is split and is composed of two unequal rami which are fused basally. In *Hippolysmata* the flagellum is simple. The character does not seem a very important one, but in my experience is reliable; it is, however, not improbable that further investigation will reveal such a degree of gradation that two distinct genera can no longer be recognized, and in this case all the species must take rank under *Lysmata.*"

By the same token *Hippolysmata acicula* and *paucidens* Rathbun[10] from Hawaii also must be considered as belonging to *Lysmata.*

In rostral formula and number of carpal articles, our species seems not unlike Miss Rathbun's *Lysmata moorei* from Porto Rico. The rostrum of the latter, however, is always longer than the eyes, exceeding them by about one half the length of its free portion, reaching at least to the middle of the second segment of the antennular peduncle; usually it is armed with two teeth below, and above with not more than five, the shorter branch of the bifurcate antennular flagellum is composed of twelve free segments and seven to nine fused ones, the free portion being the longer. Our species has the free portion the shorter or at most subequal with the fused portion. Further, in *L. moorei* the antennal scale is more truncate, the fifth abdominal somite is two thirds the length of the sixth, and the sixth four sevenths the length of the telson.

Hippolysmata porteri Rathbun[11] is a true *Hippolysmata.*

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[7] Rec. Indian Mus., vol. 10, pt. 2, no. 4, 1914, p. 112.
[8] Bull. U. S. Fish. Comm., vol. 20, pt. 2, 1900 (1901), p. 115, text-fig. 23.
[9] Proc. Acad. Nat. Sci. Phila., vol. 30, 1878, p. (2); Bull. Essex Inst., vol. 14, 1882, pl. 28, pl. 1, fig. 4.
[10] Bull. U. S. Fish Comm., vol. 23, pt. 3, 1903 (1906), pp. 912, 913, pl. 34, figs. 4, 6.
[11] Revista Chilena Hist. Nat., vol. 11, 1907, p. 49, pl. 3, fig. 4.

Latreutes fucorum (Fabricius). (Gulf-weed or Sargassum Shrimp).

Palaemon fucorum Fabricius, *Suppl. Entom. Syst.*, 1798, *p.* 404.
Latreutes ensiferus Stimpson, *Proc. Acad. Nat. Sci. Phila.*, *vol.* 12, 1860, *p.* 27. *Bate, Rept. Zool. Voy. "Challenger," vol.* 24, 1888, *p.* 583, *pl.* 104, *figs.* 1–1*g*. *Rathbun, Bull. U. S. Fish Comm.*, *vol.* 20, *pt.* 2, 1900 (1901), *p.* 114.
Latreutes fucorum Stebbing, *Trans. Roy. Soc. Edinburgh, vol.* 50, *pt.* 2, 1914, *p.* 290, *and synonymy. Verrill, Trans. Conn. Acad.*, *vol.* 26, 1922, *p.* 131, *pl.* 16, *figs.* 5–5*b*, *pl.* 42, *figs.* 2–2*t*, *pl.* 44, *figs.* 1–1*m*, 2–2*n*, 3, *and synonymy.*

Off Florida; from *Sargassum;* 8 specimens (2 ovigerous).

Off Cuba; from field of *Sargassum;* 23 specimens (17 ovigerous; 3 with parasitic isopod, *Bopyrina latreuticola* (Gissler)[12] in branchial cavity).

Locality?; 2 specimens (1 ovigerous; 1 with branchial parasite, *Bopyrina latreuticola* (Gissler)).

Verrill remarks:

"This delicate species is common in floating masses of 'gulf-weed' (*Sargassum*). It is abundant as far north as Vineyard Sound, Mass. (S. I. Smith). Very common in the Gulf Stream further south.

Bermuda (coll. G. Brown Goode). Near the Azores (Milne Edwards); African Coast (Krauss); Porto Rico (Rathbun); Beaufort, N. C. (Hay & Shore). It has been taken at Bermuda by nearly all collectors. It is nearly always associated with *Leander* [*Palaemon*] *tenuicornis* and the small crab, *Planes minutus*."

Palaemon tenuicornis Say. (Common Gulf-weed or Sargassum Shrimp).

Palaemon tenuicornis Say, *Jour. Acad. Nat. Sci. Phila.*, *vol.* 1, 1818, *p.* 249.
Leander tenuicornis Stebbing, *Trans. Roy. Soc. Edinburgh, vol.* 50, *pt.* 2, 1914, *p.* 288, *and synonymy. Verrill, Trans. Conn. Acad.*, *vol.* 26, 1922, *p.* 143, *pl.* 43, *figs.* 4, 4*a*, *and synonymy.*

Off Cuba; from field of *Sargassum;* 25 specimens (1 ovigerous).

This species is very common among Gulf-weed (*Sargassum*) and is very widely distributed in the tropical Atlantic Ocean (Verrill).

Palaemon ritteri Holmes.

Palaemon ritteri Holmes, *Proc. Calif. Acad. Sci.*, *ser.* 2, *vol.* 4, 1895, *p.* 579, *pl.* 21, *figs.* 29–35. *Rathbun, Harriman Alaska Exped.*, *vol.* 10, 1904, *p.* 29.
Palaemon sp. Rathbun, *Proc. Washington Acad. Sci.*, *vol.* 4, 1902, *p.* 291.
?*Palaemon ritteri* Rathbun, *Proc. U. S. Nat. Mus.*, *vol.* 38, 1910, *p.* 561.

South Seymour; shore pool, March 28; 1 juvenile.

Tower Island; 1 specimen.

Eden; rock pools, April 6; 1 juvenile. Northeast of Eden; seven fathoms, dredged, April 6; 1 ♀ ovigerous.

The color of the juvenile specimen from a shore pool on South Seymour is given as "almost transparent in life, with numerous black lines, and with legs brilliant scarlet at the joints."

Miss Rathbun's *Palaemon* from Clipperton Island surely is this species in spite of the somewhat different rostrum, longer sixth abdominal segment and blacker eyes. The rostrum looks a little abnormal as though possibly one or

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[12] *Bopyroides latreuticola*, Amer. Nat., vol. 16, p. 591, text-figs. 6–8. *Bopyrina latreuticola* Stebbing, Trans. Roy. Soc. Edinburgh, vol. 50, pt. 2, 1914, p. 301.

two of the most anterior teeth were wanting, either through malformation or accident, making the toothless part of the rostrum appear longer and more ascending than usual in this species; a count of the rostral teeth gives seven above of which two are on the carapace, and three below; the last dorsal tooth is a little behind the level of the median ventral one. The shorter ramus of the bifurcate antennular flagellum has eighteen free segments, and six fused, virtually in agreement with the count of typical specimens from Magdalena Bay; in these latter there are sixteen to seventeen free segments and six fused ones. The longer sixth abdomen somite might be an extreme variation, and the blacker eyes due to the preservation.

The Peruvian specimen which Miss Rathbun with some hesitation identified with this species, has the shorter ramus of the bifurcate antennular flagellum composed of twenty free and six fused segments, the carpus of the second legs is as long as the palm and half the length of the fingers together, the fingers are almost as long as the palm, and the fifth abdominal somite is contained one and two thirds times in the length of the sixth.

The species ranges from San Diego, California, (type locality) to Peru (Rathbun).

Macrobrachium jamaicense (Herbst). (Fresh-water Shrimp or Crayfish).

Cancer (Astacus) jamaicensis Herbst, *Naturg. d. Krabben u. Krebse, vol.* 2, 1792, *p.* 57, *pl.* 27, *fig.* 2.
Palaemon jamaicensis Ortmann, *Zool. Jahrb., vol.* 5, 1891, *p.* 729, *pl.* 47, *fig.* 7. *Rev. Mus. Paulista, vol.* 2, 1897, *p.* 208. *Moreira, Archiv. Mus. Nac. Rio de Janeiro, vol.* 11, 1901, *p.* 13, 78.
Bithynis jamaicensis Rathbun, *Bull. U. S. Fish Comm., vol.* 20, *pt.* 2, 1900, (1901), *p.* 123.
Macrobrachium jamaicense Rathbun, *Proc. U. S. Nat. Mus., vol.* 38, 1910 *p.* 561, *pl.* 51, *fig.* 1.

Colon; 1 ♂, 1 ♀.

Gatun spillway, Colon; 1 juvenile.

The juvenile specimen from the Gatun spillway is very probably this species. It is almost impossible to distinguish the young from those of *Macrobrachium olfersii* (Wiegmann).[13]

Miss Rathbun (1910) gives the distribution of this species as, "Fresh waters of Pacific slope of America from Lower California to Peru and of Atlantic slope, from Texas to Brazil, including West Indies."

Urocaris longicaudata (Stimpson).

Urocaris longicaudata Stimpson, *Proc. Acad. Nat. Sci. Phila., vol.* 12, 1860, *p.* 39 [108]. *Kingsley, Proc. Acad. Nat. Sci. Phila., vol.* 31, 1879 (1880), *p.* 424. *Rathbun, Proc. Washington Acad. Sci., vol.* 11, 1900, *p.* 155. *Hay and Shore, Bull. U. S. Bur. Fisheries, vol.* 35, 1918, *p.* 395, *pl.* 27, *fig.* 7.

Off Cuba; from *Sargassum;* 1 ♀ ovigerous.

This species is not infrequent, though never taken in large numbers[14] in the area bounded by Beaufort, N. C., and the Bahamas on the North, Porto Rico and Culebra on the East and with Jacuma, Parahyba, Brazil as its southern limit.

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[13] Arch. f. Naturg., vol. 2, pt. 1, 1836, p. 150, =*Palaemon spinimanus* von Martens, Arch. f. Naturg., vol. 35, pt. 1, 1869, p. 26, pl. 2, fig. 3.

[14] The U. S. National Museum possesses, in all, nineteen lots of this species, but two from Florida and one from the Bahamas contain fourteen or more specimens, two lots have four specimens, two, two specimens, and the rest one each.

Petrolisthes edwardsii (Saussure). (Scarlet Tissue Crab).

Porcellana edwardsii Saussure, *Rev. et Mag. de Zool., ser. 2, vol. 5*, 1853, *p.* 366, *pl.* 12.
Petrolisthes edwardsii Nobili, *Bull. Mus. Torino, vol.* 16, *no.* 415, 1901, *p.* 11. *Rathbun, Proc. U. S. Nat. Mus., vol.* 38, 1910, *p.* 600.

Eden; rock pools, April 6; 6 specimens.
Ranges from the Gulf of California to Ecuador.

Calcinus obscurus (Stimpson).

Calcinus obscurus Stimpson, *Ann. Lyc. Nat. Hist. N. Y., vol.* 7, 1859, *p.* 83. *Rathbun, Proc. U. S. Nat. Mus., vol.* 38, 1910, *p.* 596. *Nobili, Bull. Mus. Torino, vol. 16, no.* 415, 1901, *p.* 26.

Eden, off Indefatigable Island; 6 specimens.

These specimens are much darker colored than others of the same species from farther north. The dactyls are all double banded, one near the tip and one at the base of the joint; in alcohol, the general coloration of the extremities is a dark, purplish red-brown with white or bluish maculations, the carapace, proximal third of the legs and eyestalks are quite a red brown; where the ground color is lighter, the spots or maculations appear more or less yellowish. A specimen from Chatham Island in the United States National Museum collections shows the coloration noted in this Eden material. Published records seem to indicate that this species ranges from Lower California to Ecuador.

Coenobita clypeatus (Herbst).

Cancer clypeatus Herbst, *Naturg. d. Krabben u. Krebse, vol.* 2, 1791, *p.* 22, *pl.* 23, *figs. A, B.*
Coenobita diogenes Benedict, *Bull. U. S. Fish Comm., vol.* 20, *pt.* 2, 1900 (1901), *p.* 139. *Verrill, Trans. Conn. Acad., vol.* 13, 1908, *p.* 438, *text-fig.* 55, *and synonymy.*
Coenobita clypeatus Rathbun, *Rapport van de Visscherij en de Industrie van zeeproducten in de Kolonie Curacao, uitgebracht door Prof. Dr. J. Boeke, pt.* 2, 1920, *p.* 327 [11], *and synonymy.*

Colon; 3 ♀.

A common West Indian species ranging from Florida to Brazil; also at Bermuda.

Coenobita compressus (Guérin).

Coenobita compressa Guérin, *Voy. autour du Monde sur la Coquille par Duperrey, Zool., vol.* 2, *pt.* 2, 1831, *p.* 29.
Coenobita compressus Faxon, *Mem. Mus. Comp. Zoöl., vol.* 18, 1895, *p.* 52. *Rathbun, Proc. U. S. Nat. Mus., vol.* 38, 1910, *p.* 596.

James Island; 1 ♂, 1 ♀.

Miss Rathbun gives the distribution of this species as, "Lower California to Payta, Peru; Galapagos Islands; westward to East Africa."

Hippa denticulatifrons (Miers).

Remipes testudinarius, var. *denticulatifrons* Miers, *Jour. Linn. Soc. London, vol.* 14, 1878, *p.* 318, *pl.* 5, *fig.* 2. *Balss. Abh. der K. Bayer. Akad. Wissen., vol.* 2, *Math.-phys. Klasse Suppl., Abh.* 10, 1914 *p.* 92, *text-fig.* 50.
Remipes adactylus denticulatifrons Ortmann, *Zool. Jahrb. Syst., vol.* 9, 1896, *p.* 229, *and synonymy.*
Hippa denticulatifrons Rathbun, *Proc. U. S. Nat. Mus., vol.* 38, 1910, *p.* 595.

Conway Bay, Indefatigable Island; March 28; 1 ♂.

Northeast of Eden; 7 fathoms, dredged, April 6; 1 ♂.

This species is known from the Galapagos Islands and the Indo-Pacific region as far north as Japan.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Soc ety. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

Zoologica Vol. V, No. 16.

HYMENOPTERA
COLLECTED BY THE WILLIAMS GALAPAGOS EXPEDITION

By S. A. Rohwer

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The Hymenoptera listed below were forwarded to me by Dr. William Beebe for identification. They were collected in the Galapagos Islands, in April, 1923, in an expedition sent out by the New York Zoological Society. One of the species had been given a manuscript name by the late Dr. Ashmead from specimens collected in 1899. The series to which Ashmead had assigned the manuscript name is used as types for the new species and the material forwarded by Dr. Beebe are considered paratypes.

Xylocopa colona Lepeletier

Twenty-two specimens which agree very well with the description of this species and also agree perfectly with specimens in the National Collection which were collected in the Galapagos Islands in 1899 and later forwarded to the British Museum, where they were compared by the late Dr. David Sharp with specimens of this species in the collections of the British Museum. Ducke[1] considers that *colona* Lepeletier is a variety of *aurulenta* Fabricius. For the purpose of this report I have preferred not to enter into the validity of this name. The above-mentioned 22 specimens were collected at the following localities: South Seymour, April 23, 1923; at Tagus Cove, Albemarle, April 6, 1923; at Conway Bay, Indefatigable, April 1, 1923.

Tachysphex galapagensis sp. nov.

In general appearance and habitus this species resembles many of the Nearctic forms, but the color of the abdomen is strikingly characteristic inasmuch as the venter is entirely pale and the dor um pale on the apices of the tergites only.

Female.—Length, 8 mm. Clypeus shining, convex, the anterior margin depressed and very gently rounded, without lateral teeth frons coriaceous, distinct impressed line from the anterior ocellus to between the bases of the antennae; interocellar area parted by a longitudinal depression; vertex with distin t, well separated punctures; superior interocular line less than half of the inferior interocular line and shorter han the comb'ned 'ength of the pedi-

[1] Deutsch. Ent. Zeit. 1910, p. 364.

First form on press April 28, 1924.

cellum and first joint of the flagellum; flagellum filiform, third, fourth and fifth joints subequal; scutum shining, with distinct, medium sized punctures which are separated laterally by a distance equal to the width of the puncture but medianly are much closer; scutellum with punctures like the scutum but much more widely separated; dorsal aspect of the propodeum coriaceous, with longitudinal wrinkles basally (the length of these wrinkles varies to some extent; in some specimens they extend beyond the middle of the propodeum); dorsal aspect of the propodeum perpendicular, transversely aciculate, the median depression elongate; sides of the propodeum finely longitudinally rugulose; inner spur of the posterior tibia two thirds as long as the basitarsus; abdomen shining, but when highly magnified feebly laminate; the apical margins of the tergites distinctly depressed; pygidium polished, with a few distinct punctures laterally, about two times as long as basal width; first abscissa of radius longer than either of the two following, second and third subequal (in certain paratypes the second abscissa is slightly longer than the third). Black; the venter of the abdomen, the apical margins of all tergites pale ferrugineous; the anterior tarsi, the fou posterior tarsi beneath and the spines pale ferrugineous; the spines on the basal part of the legs white; body densely clothed with silver pile; wings dusky hyaline, slightly iridescent; venation dark brown.

Male.—Length, 5.5 mm. The anterior margin of the clypeus is not as broadly depressed as in the female, the convex portion slopes more abruptly; front more strongly coriaceous than in the female; superior interocular line half as long as the inferior interocular line, distinctly greater than the length of flagellar joints one and two but not quite as great as the length of joints one, two and three; flagellum very stout, the basal joints unusually short, the third and fourth shorter than the fifth; scutum sculptured similar to the female; dorsal aspect of the propodeum with the longitudinal wrinkles better defined than in the female; the ventral portions and the sides of the propodeum coriaceous; legs stout; the inner spur of the posterior tibiae three fourths as long as the hind basitarsus; apical tergite with a gentle, arcuate emargination. Colored as in female; wings hyaline, venation dark brown.

A paratype female from South Seymour is smaller than the other females (6 mm.) and has a decidedly polished appearance; the sculpture is not as coarse, but otherwise it seems to agree. The paratype females from South Seymour have the wings almost hyaline.

Type Locality.—Albemarle, Galapagos Islands.

Paratype Locality.—South Seymour, Galapagos Islands.

Described from six females (one type), one of which has lost its head, and fifteen males (one allotype) collected at the type locality March 21, 1899, and from three females from the paratype locality collected April 23, 1923.

Type, allotype, paratypes.—Cat. No. 5513 U. S. N. M.

Paratypes from the paratype locality returned to the collection of the New York Zoological Society.

Aporinellus galapagensis sp. nov.

This new species is very similar to the Nearctic *fasciatus* (Smith) but differs in minor ways, and it seems to be worthy of a name.

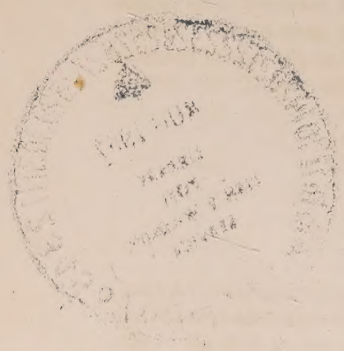
Male.—Length, 4.5 mm. Anterior margin of the clypeus truncate; frons finely granular with an indistinct median longitudinal line; vertex slightly raised between the posterior ocelli, shining, very feebly sculptured; postocellar line subequal with the ocellocular line; antenna stout, filiform; flagellum with short, dark bristles beneath; third antennal joint about one fourth shorter than the fourth; posterior margin of the pronotum broadly arcuate; pronotum, scutum and scutellum subopaque, finely granular; propodeum finely granular but when highly magnified appears transversely laminate, slightly depressed at the basal middle; abdomen finely laminate; inner spur of the posterior tibiae four fifths as long as the posterior basitarsus; legs feebly spined; first abscissa of the radius slightly shorter than the second; the second abscissa of the cubitus subequal with the second abscissa of the radius; second recurrent received well before the end of the second cubital cell; nervulus very slightly ante-furcal. Black; densely clothed with silver pile which forms broad fasciae at the apical margins of the tergites; wings hyaline, strongly dusky beyond the end of the second cubital cell; venation black.

Type Locality.—South Seymour, Galapagos Islands.

Described from a single male collected April 23, 1923.

Type.—Cat. No. 26600 U. S. N. M.

Chalcis sp.

A single male collected April 23, 1923, at South Seymour represents a small species which does not seem to agree with any of the described forms from South or North America, but inasmuch as the species of *Chalcis* are so difficult to distinguish, and this is particularly true in the male, it seems unwise to describe this specimen until more material has been collected.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."